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THE ARCHIVES OF PHYSIOLOGICAL THERAPY

Devoted to the Diagnostic and Therapeutic Uses of Electricity, Radiant Energy, Heat, Water, Mechanical Vibration, Dietary Regulation, Exercise, Psychic Suggestion, etc.

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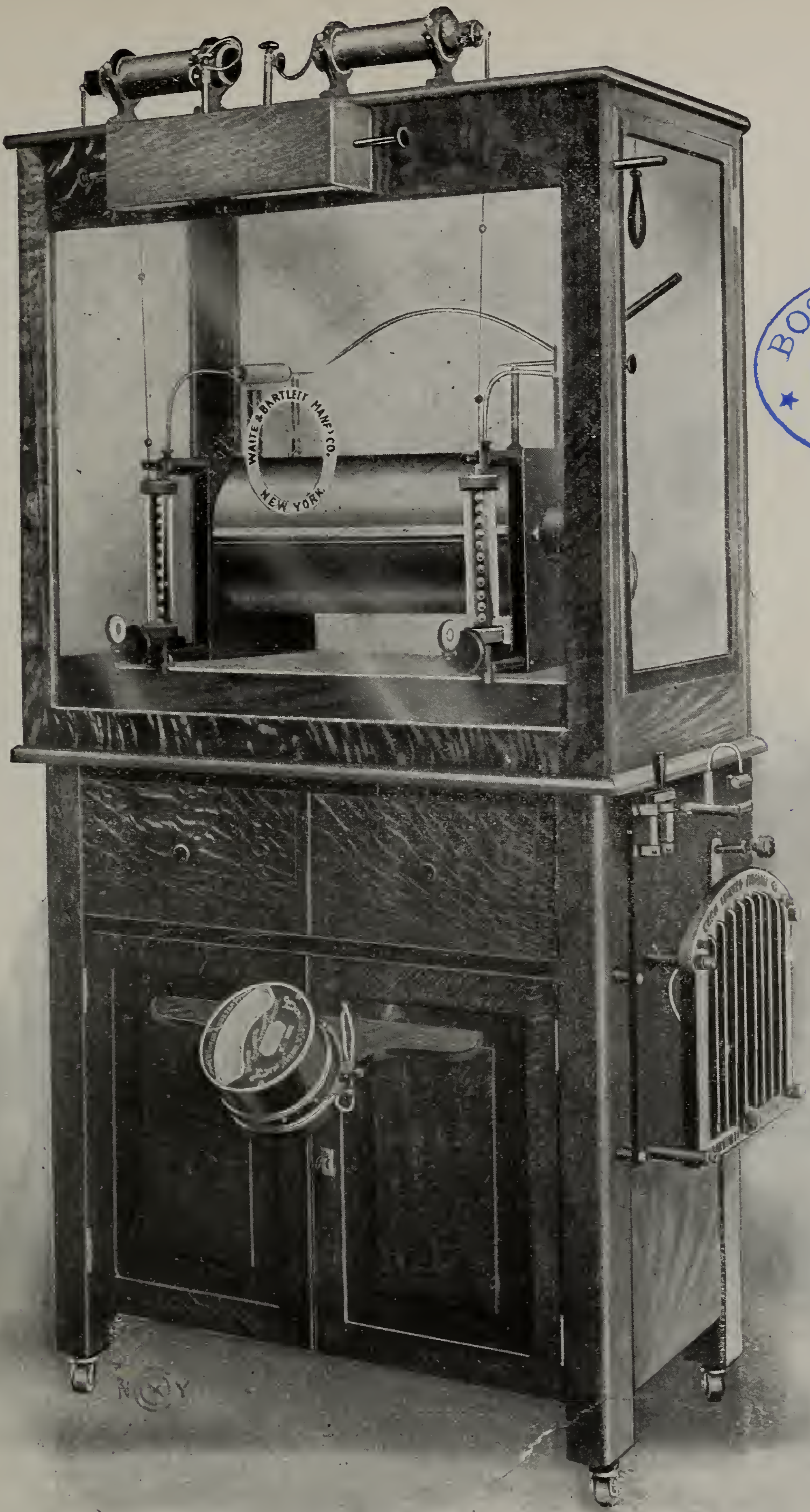

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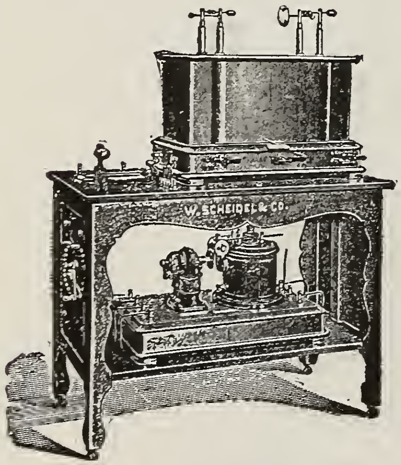

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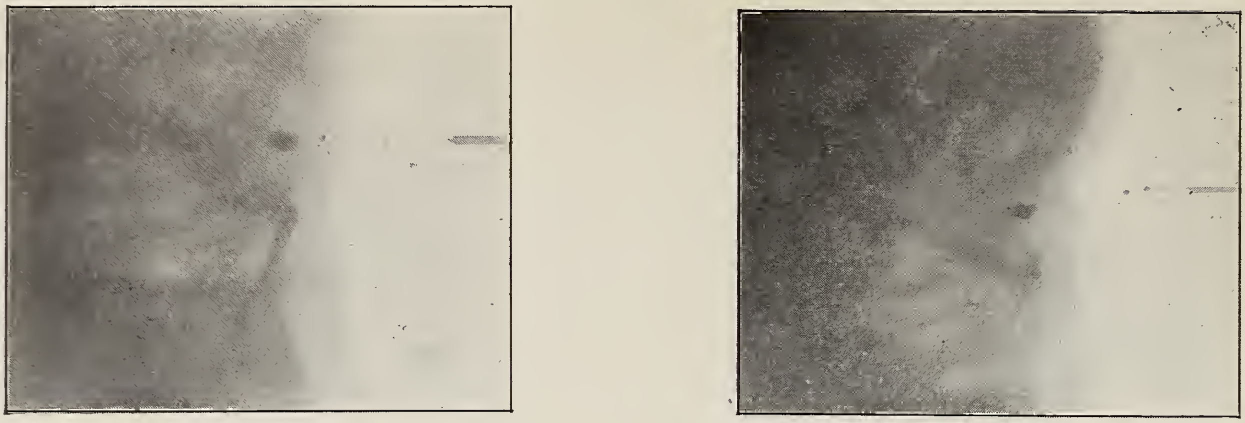


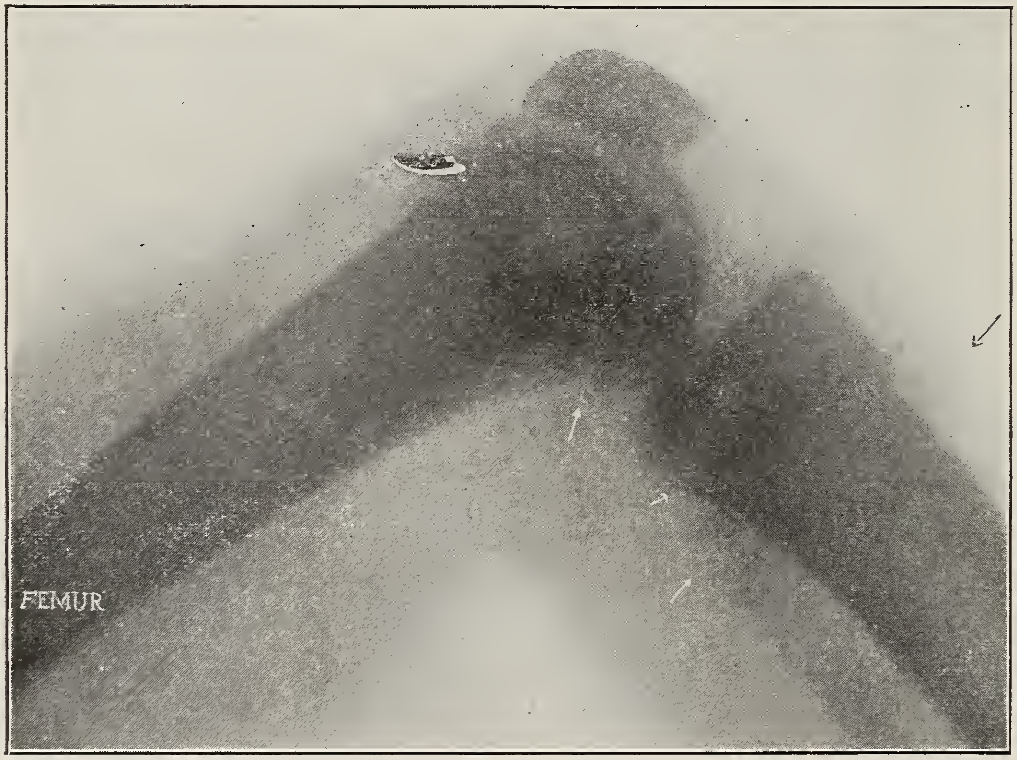
Special Plate LXI

BIRD-SHOT IN THE RIGHT ORBIT

The shot was found in the tissues outside the eyeball, having gone completely through it. This fact decided the oculist, who referred the case to me, Dr. E. W. Stevens, not to remove the eyeball and not to remove the foreign body. As a result the patient has a normal looking eye with useful vision.

Made with a 15-inch Carstarphen coil operated upon a 220-volt direct current, with mercury jet interrupter, exciting a vacuum regulating tube eight inches in diameter, operated at a medium low vacuum. The anode was located 25 inches from the plate, which was a Cramer medium isochromatic. Exposure two minutes. The Sweet localizing plate-holder was used, but no intensifying screen or diaphragm.

By Dr. George Henry Stover, Denver, Colorado.

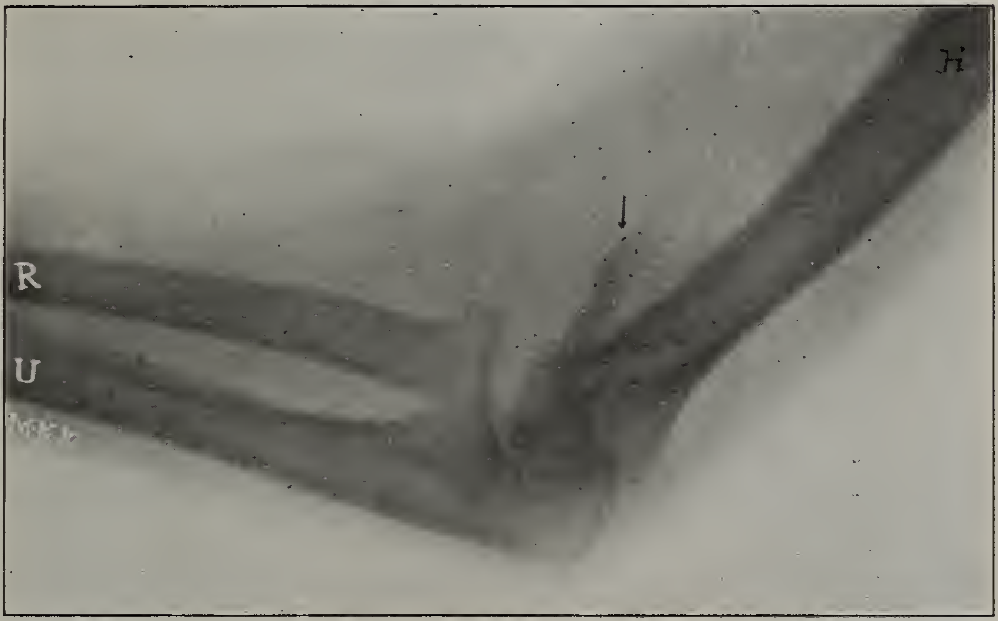


Special Plate LXII

DETACHMENT OF LIGAMENTUM PATELLAE FROM TUBEROSITY OF THE TIBIA

The patient was a boy sixteen years old, and the accident occurred while kicking foot-ball.

By Dr. M. K. Kassabian, of Philadelphia, Pennsylvania.



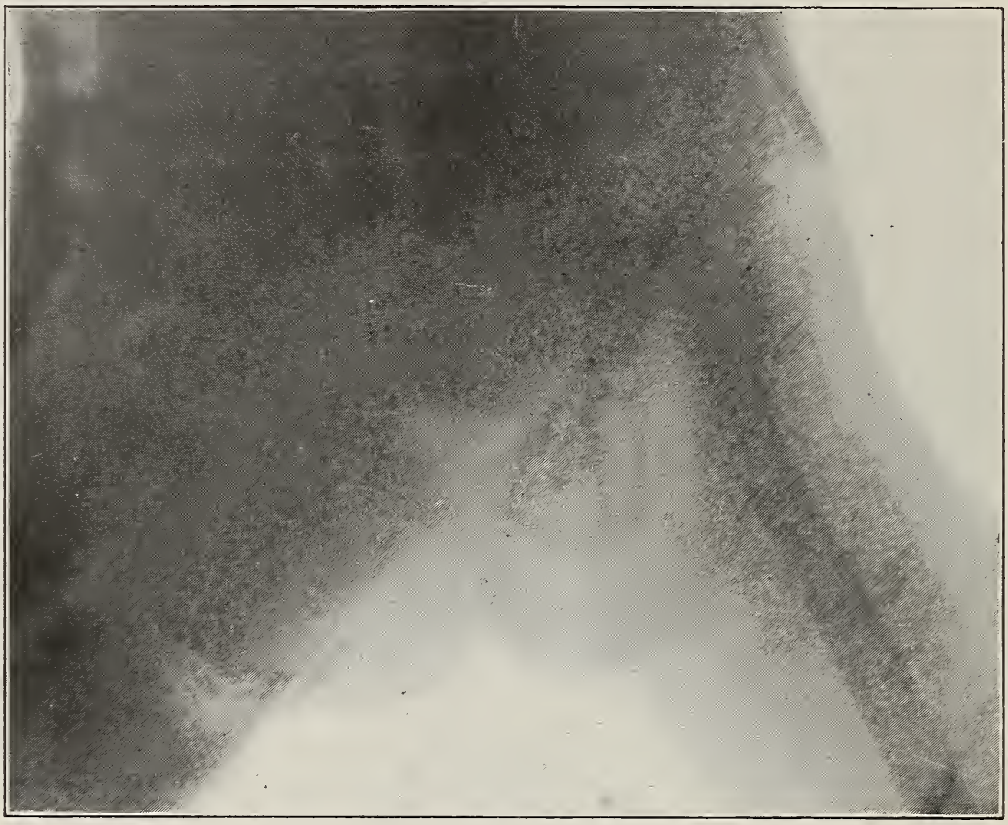
Special Plate LXIII

LATERAL VIEW OF THE ELBOW JOINT, SHOWING DETACHMENT OF THE SUPINATOR LONGUS MUSCLE FROM THE HUMERUS

The abnormal shadow is that of the periosteum where it was torn off. Antero-posterior view did not reveal any fracture shadow.

The accident happened two months before this roentgenograph was taken, and flexion and extension are limited; patient is unable to open or unlock a door.

By Dr. M. K. Kassabian, of Philadelphia, Pennsylvania.



Special Plate LXIV

The child from whom this Roentgenograph was made was operated upon six months ago by the Lorenz method for reduction of the left hip. Roentgenograph of the left hip taken at the time showed that the head of the bone had not been reduced into the acetabulum, although the hips were on a level by measurement and the surgeon stated that when he reduced the head of the bone he could feel it slip into the socket. The above roentgenograph of both hips was then taken showing that the head of neither bone was in the acetabulum but in a false joint above.

Taken with a 20-inch coil with mechanical break, water-cooled tube, anode 24 inches from plate, exposure one minute. Metol hydrochinon developer.

By Dr. J. N. Scott, of Kansas City, Mo.

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VOLUME IV JULY, 1906 NUMBER I

A CASE OF LEUKOPLAKIA TREATED BY RADIUM *

BY WOLFF FREUDENTHAL, M. D., NEW YORK

OF the different rays employed nowadays for therapeutic purposes it is those emanating from radium that interest us tonight. After the foolish enthusiasm displayed by some writers a few years ago, it now seems a pity that the whole question of radium treatment is being thrown overboard by most investigators. I say it is a pity because I am fully convinced that humanity will derive material benefit from continued study of the therapeutic properties of these wonderful rays. Indeed, radium has been a help to us already in some cases. It shares with other rays (actinic and Roentgen rays especially) the power of relieving certain pains and it has like the others brought to a cure cases of carcinoma of the skin of the face, of lupus, and rodent ulcer. But in addition it seems to have some beneficial effect on internal malignant tumors, as of the œsophagus, etc.: in other words, on growths situated in cavities that can very easily be entered by the radium. It would be a great loss if these investigations should be dropped, and I sincerely hope that a number of reliable men will within the next few years give us some positive and definite data on this subject.

The case I have the honor to demonstrate may perhaps be of interest to you.

The patient is a man fifty-eight years of age and a liquor dealer. He had been accustomed to indulge moderately in alcohol and tobacco, but had given up both entirely since coming under my care. He was married and his wife and children were all healthy.

When he was twenty years of age, in Singapore, he sustained a fall upon his head. Afterwards he suffered a great deal from headaches and "moon" blindness, not being able to see at night. Later he was operated upon and felt better and could see again all right. For the last ten years or so he has suffered from his present trouble and has been under treatment by various physicians for five years past. The last physician who treated him was a member of this section, who, after trying everything he could think of, turned him over to me to try the effect of radium.

---

* *Demonstrated before the Section on Laryngology of the New York Academy of Medicine, March* 28, 1906.

When first seen the patient presented an undoubted case of leukoplakia. The diseased area spread all over the left cheek and the superior maxilla, extending in front almost to the middle line. At that time there was a great deal of ulceration which caused so much pain that the man could not sleep at night. The question which presented itself was whether it was a simple case of leukoplakia or whether it was a malignant tumor. A piece was removed for examination and the pathologist reported that there was no trace of malignancy.

As almost everything else had been tried without avail it was decided to see what radium would do. At first it was used for three minutes, then for six, ten, and up to twenty minutes, but mostly fifteen minutes at a sitting. The treatment was applied twice a week, commencing on the 18th of December, 1905. On the 23rd of December the patient reported that he felt somewhat easier and during the month of January he felt quite easy all the time, had no pain, could go about his business, and slept well. In January an attempt was made to relieve the ulceration more quickly by using the galvano-cautery in a mild form but this did not help at all.

Up to the 6th of February the patient felt quite well, when he again began to complain of pain, and at one time it was so severe that the radium was omitted and the high frequency current and actinic rays applied. On February 13th he felt comfortable again and this continued until the 27th when, after being treated regularly again, there was a fresh granulation with the superficial ulcerations. On March 2d this was broken down and he had a very large ulcerating surface, much larger than at present. He complained of so much pain that the radium was again discontinued. On the 22d he again felt easier and the radium treatment was again applied, and on the 27th he felt quite comfortable.

From the beginning of the treatment orthoform was used with the radium. It is well known that orthoform relieves pain, but in this case the relief obtained could not be attributed solely to the orthoform, because if the patient used the orthoform himself at home he did not obtain the relief which he experienced when it was used in connection with the radium.

Most of the cases of leukoplakia which I have been able to follow up underwent various changes and finally developed into malignancy. I recall one especially which I followed up for ten or twelve years, a case of leukoplakia extending from the tongue and finally developing into epithelioma. Half of the tongue was removed six or seven years ago and the patient is living still and fairly comfortable. I had never seen a case where the growth disappeared entirely.

Clinically this case presents several symptoms of malignancy, and it is my intention to remove another piece of the growth for examination. If, however, it should be found microscopically that epithelioma has developed, what else could be done to afford the patient relief? Large doses of morphine had been tried but did not help at all. Radium had afforded some relief and under the circumstances it seemed best to continue with that treatment. The radium used was screwed on to the end of a probe, and I found it much easier to apply it this way than with the more bulky instruments recommended in France.

I do not bring the patient to show the Section any great results obtained by the use of radium, but in such a case we have to look for some remedy that will help to relieve the pain, and radium has given this patient more relief than anything else that has been tried. We do not yet know how to apply it and have no means of judging how far we should push it, but the future will probably teach us much about it that we do not now know. I have brought the patient to the meeting hoping that the gentlemen present will express their opinions concerning it and make some suggestions as to the further treatment.

DRY HOT AIR IN THE MANAGEMENT OF SOME COMMON PATHOLOGICAL CONDITIONS*

BY CLARENCE EDWARD SKINNER, M. D., OF NEW HAVEN, CONN.
Physician in charge of the Newhope Private Sanitarium

Continued from June Number

FIRST. Arthritis deformans very rarely attacks one joint at a time, with the exception of the hip. Rheumatism frequently does.

Second. Arthritis deformans frequently attacks the maxillary articulation, producing various degrees of masticatory stiffness, even to complete lockjaw. Rheumatism very rarely attacks this joint.

Third. In the great majority of cases of arthritis deformans several joints of the fingers or toes are involved, even when the process commences in the large articulations. Rheumatism attacks the fingers and toes infrequently, and when it does it involves only one or two of these joints.

Fourth. The swelling of the joints in early arthritis deformans is rarely marked. In rheumatism it usually becomes prominent at once.

Fifth. A smooth, glistening, satiny appearance of the skin in the vicinity of one or more of the affected joints ("glossy skin"), looking very much like the enamel on china-ware, frequently develops early in arthritis deformans, even when no inflammatory tension is present. In rheumatism the only appearance of the skin which even approaches this is when tension from swelling is present.

Sixth. Atrophy of the musculature controlling the joint is apt to appear early in arthritis deformans. In rheumatism atrophy does not appear until after the disease has impaired the joint function for some time.

Seventh. A peculiar pigmentation of the skin, like freckles, develops in most cases of arthritis deformans, occurring in maculæ, which vary in size from that of a pin-head to that of a silver dollar, the smaller sizes predominating, however. This characteristic pigmentation never appears as a result of rheumatism.

Eighth. Patients suffering from arthri-

Read at the One Hundred and Forty-Second Annual Meeting of the Litchfield County Medical Society, at Winsted, Connecticut, April 24, 1906.

tis deformans do not usually perspire much; there is sometimes present, however, a peculiar, greasy wetness of the skin, which may be profuse. Rheumatic patients are usually bathed in a drenching perspiration, which necessitates frequent changes of clothing.

Ninth. The temperature of arthritis deformans pursues a fairly regular course, being normal or below in the morning, beginning to rise during the forenoon, and reaching its maximum (from 99.5 degrees F. to 100.5 degrees F.) in the late afternoon or early evening. The temperature of rheumatism is absolutely irregular in its course and frequently reaches 102 degrees F. or over.

Tenth. The discomfort in the joints of arthritis deformans usually begins as a slight, sore, stiffness upon movement and gradually increases during a period of weeks or months, until it becomes severe and fairly constant. The discomfort of rheumatism develops rapidly and rises in a few hours or days to an excruciating intensity.

Eleventh. When a case of joint inflammation fails to give marked evidence of response to thorough salicyl medication within forty-eight hours, it may safely be set down as something else than rheumatism, and if gonorrhœa, sepsis, osteomyelitis, tuberculosis, syphilis, and malignant disease have been excluded, arthritis deformans should occupy a prominent place on the diagnostic horizon.

Twelfth. In rheumatism the local dry hot air application gives immediate and practically complete relief from pain. In arthritis deformans it sometimes gives some relief, usually none at all, and not infrequently makes it worse.

There are other differential points, but they are such as demand close familiarity with the disease for their correct interpretation and a careful consideration of those I have mentioned with reference to any individual case will almost always suffice for determining with what one has to deal.

The successful treatment of arthritis deformans consists, briefly, of the " general " or " body " dry hot air treatment, which is the most important element of all; the various electrical modalities, notably the static wave, static spark, the high-frequency and continuous currents; mechanical vibratory stimulation, dietary regulation, and hydrotherapy. Only three or four drugs are of any use whatever, and these only in combination with the measures just mentioned, and anti-rheumatic therapeusis is frequently actively as well as passively pernicious in this disease. The physiological measures are applied in various combinations according to the variations from time to time in the patient's condition, but as these combinations are not attainable in general practice we do not need to consider them at this time.

Local Septic Infection

This is another condition in which the physiological influences of local thermærotherapy are most exquisitely appropriate. The primary lesion is distinctly local, it involves a lowered vitality, or lack of physiological resistance on the part of the involved tissues, and in the majority of cases it occurs upon one of the extremities at a considerable distance from the trunk.

The therapeutic indications are (1) to increase the physiological resistance of the invaded structures whereby the pabulum of the micro-organisms is so modified as to inhibit their development, lessen the virulence of their toxic emanations, and finally to accomplish their destruction; and (2) to eliminate as rapidly and profusely as possible the toxic products already formed and present in the affected parts.

A comparison of the physiological action of this therapeutic agent with the pathology and therapeutic indications present in this ailment, explains at a glance why dry hot air would be expected to exhibit helpful attributes, and the clinical findings again bear out most happily the theoretical deductions. If a case is gotten under treatment by dry hot air before the infective process has invaded that portion of the limb (lymphatics or other structures) immediately contiguous to the trunk, and before suppuration has been established, the pathological phenomena will usually be abruptly arrested and the inauguration of convalescence will coincide with the first treatment. If suppuration has supervened, however, the destructive process will become sharply localized about the focus of infection when, by a stroke of the knife, the pus can be evacuated and the case brought to a rapid and satisfactory termination.

Pneumonia

I was first led to employ dry hot air in the treatment of pneumonia by the magical results which followed its use in a case of peritonitis; if it would so happily and profoundly influence the peritoneum, why might one not expect it to prove helpful in inflammation of the pleura, which membrane resembles the peritoneum so closely as regards both structure and anatomical location?

An opportunity to test the inference soon presented and the outcome surpassed my sanguinest expectations. After thirty minutes' treatment the pleuritic pain was relieved, the cough greatly lessened, respiration had fallen from fifty to thirty-two per minute, and the pulse from one hundred and thirty to one hundred and sixteen, with marked increase in its volume and tension. At that time I looked upon these modifications of the symptomatology as due entirely to relief of the pleurisy, but by the next day the consolidation had become less prominent and thirty-six hours later, during which period four additional dry hot air applications had been made, it had, to my profound astonishment, entirely disappeared, and the amelioration of the general symptomatology was marked to a degree.

Such a consummation was entirely without parallel in my previous experience and rendered it difficult for me to credit the evidence of my own senses, but when the same result is observed to follow the exhibition of a given procedure in instance after instance, one is at last constrained to believe that such a procedure constitutes the active agency in producing the result, and such has been the case with dry hot air in pneumonia. I regard it, when properly administered, as the most efficient and satisfactory agent that we possess today for the combatting of this disease, and second to it I would place the administration, in efficient dosage, of some substance like creosote carbonate, which is excreted largely through the lungs and is inherently antagonistic to the development of the pneumococcus. The exhibition of such a substance also constitutes a most helpful auxiliary to thermærotherapy in this disease.

To bring the proposition nakedly before you I will summarize what may be expected to follow local thermærotherapy in pneumonia, as follows:

First. Relief of the pleuritic pain in a few minutes, which relief lasts for from one to eight hours, and disappearance of the pleurisy itself in from twenty-four to forty-eight hours.

Second. Immediate relief of that proportion of the cough and respiratory acceleration which is due to the pleurisy.

Third. A decrease in the febrile movement of from half a degree to one degree Fahrenheit, within eight hours, and an immediate improvement in the patient's general condition.

Fourth. Disappearance of the physical signs of consolidation in from two to five days.

Fifth. A marked lessening in the severity of the symptomatology but little, if any, shortening of the duration of the disease.

The statement of such a proposition will, I am aware, provoke something of a strain upon your credulity, hence we will glance for a moment, if you please, at the pathology of pneumonia and see if these statements are not logically reconcilable therewith.

Etiology and Pathology—As to the primary etiology and initial evolution of the disease there are still differences of opinion, but there is general agreement that when it is fully developed the following factors are constantly present:

First. A micro-organism, the diplococcus of Fraenkel, cultures of which develop in the pulmonary alveoli, and give rise to toxins which are absorbed into the circulation. These toxins produce the general systemic deterioration, and a debility or degeneration of the heart muscle which is responsible for a large proportion of the "heart failure" so common in this disease.

This diplococcus grows best in a faintly alkaline medium, its life period in laboratory cultures is from ten to twelve days, and it is one of the most sensitive of all bacteria to changes in the character of its pabulum, a marked acidity or a very slight rise in temperature being sufficient to inhibit its development entirely.

Second. A fibrinous exudation into the alveoli which constitutes the pabulum of these micro-organisms.

Third. A mechanical interference, of greater or less extent, with the pulmonary or functional, *not the nutrient*, blood-supply of the lung, due to the presence of this exudate.

A localized pleurisy is also usually present, to the pain and reflex nervous irritation of which is due a large proportion of the respiratory acceleration and cough.

Now a comprehensive conception of the evolution of the different events which make up an attack of pneumonia, is most helpful in studying the different phases of the disease, and that put forward by Professor Andrew H. Smith of New York City is lucid and to the point and we cannot do better than to quote it in full in this connection.

"1. The occurrence of some cause of depression, either local or general, which favors the germination of pneumococci, already present in some one of the smaller tubes.

"2. The formation of a colony that spreads until it reaches the group of air-vessels that are terminal to the tube in question.

"3. The setting up of an irritation in these vessels, causing a fibrinous exudation, an emigration of leucocytes, and a diapedesis of red cells from the functional capillaries.

"4. The formation of a colony of pneumococci in the medium afforded by this exudate.

"5. Arrest of the blood stream in the functional capillaries, followed by accumulation of free pneumic acid in the parenchyma of the affected area.

"6. An overflow of exudate into neighboring lobules, starting the process in them also.

"7. Arrest of germ growth by the exhaustion of the medium and the accumulation of free acid in the tissue of the lung. Up to this time there has been a constant formation and absorption of toxin.

"8. Retrogressive changes in the exudate preparatory to its removal by absorption.

"9. Probably, in this latter process, formation of an antitoxin principle.

"10. Entire removal of the exudate, and restoration of the vesicle to its normal condition.

"11. Resumption of the functional capillary circulation."

Rationale—The points to be borne in mind in connection with the rationale of thermærotherapy in pneumonia are as follows:

First. The life-period of Fraenkel's diplococcus in laboratory cultures is from ten to twelve days.

Second. We have a condition here which is closely analogous to that which obtains when cultures of the organism are grown in the laboratory, the walls of the pulmonary alveoli acting as test tubes and the exuded fibrin as culture medium.

Third. This organism is exquisitely sensitive to changes in the reaction and temperature of its pabulum.

Fourth. The most virulent toxin-producers are the youngest of the germ colonies which are located at the periphery of the affected area where the cultures are thinnest and spreading into other alveoli.

Fifth. The general systemic disturbances, including heart failure, are caused by the pernicious influence exercised upon nerve centers, muscles, and glandular structures, by the toxins emanating from the germ cultures in the alveoli and which are absorbed into the blood.

Sixth. In many cases, much of the cough and a considerable proportion of the respiratory acceleration are due to reflex irritation and pain, set up by the pleurisy which usually accompanies this ailment.

Seventh. When consolidation has taken place, the layers of the pleuræ being in apposition and even sometimes absolutely adherent, we have practically a solid tissue from the integument to the inner limit of the consolidation, except in those comparatively infrequent cases where the consolidation is central exclusively.

Eighth. Death is directly due either to paralysis of nerve centers from toxin absorption, or paralysis of the right heart from over-distention precipitated by massive exudate and a toxin-weakened heart muscle.

Now when a local dry hot air treatment is administered over a consolidated lobe, what is the sequence of events inaugurated thereby?

First. We have seen that the application of this measure tends to accelerate the natural sequence of metabolic events. We have also seen, according to Professor Smith's statement, that the evolution of pneumic acid in the lung to a degree sufficient to inhibit further development of the colonies of pneumococci, constitutes a natural phase of the later stages of consolidation. Would it be illogical, then, to consider that one of the factors in producing the beneficent effects of local thermærotherapy, was an immediate lessening or inhibition of the vitality and development of the infectious agents, brought about by the hastening of an event, the formation of pneumic acid, which constitutes a feature in the natural history of the disease?

Second. As the heat is applied to the front and back as well as the side of the chest over the affected region, and as the affected part of the lung is practically a solid tissue continuous with the external skin, is it not reasonable to infer that the heat could be made to penetrate in some degree, nearly, if not quite, through the whole of the affected area by conduction? If so, then the temperature of the pabulum of the invading micro-organisms would be raised, and one of the most essential conditions of their well-being disturbed. It is only in the absence of a disturbance of these conditions that this germ is able to grow at all, hence this result would very certainly exercise an inhibitory influence upon its development, from which would result a lessening of the quantity and virulence of the toxins formed.

Third. As the general symptomatic phenomena are due to absorption of these same toxins, any influence which lessened their quantity or virulence would also lessen the intensity of the general symptoms, and we should expect, as a result of the application of such an influence, a drop in the body temperature and a considerable amelioration of the depression of the nerve centers; and bedside experience demonstrates that this is what actually takes place.

The fourth and last event is the disappearance of the consolidation in from two to five days, which removes the danger of cardiac over-distention and paralysis from this cause. This is brought about, of course, by the powerful reflex stimulation of the absorptive functions and the acceleration of the normal retrogressive processes in the exudate.

But the above at once suggests the query, "If this is true why would it not be possible to abort pneumonia, to cut the attack short at once with the local dry hot air treatment?" The explanation is as follows:

We have seen that the germ colonies tend to invade other air cells and bronchioles by spreading from the periphery of the consolidated area, and that these youngest, peripheral colonies give rise to the most virulent of the toxins. Those air cells and bronchioles, which have been newly invaded, are not yet consolidated, hence have not yet become solid tissue, and air still circulates through them. It would, therefore, be impossible to raise the temperature of these parts very markedly if at all, and the inhibitory influence susceptible of induction in the fully consolidated portion could not be attained here. These colonies, therefore, would continue to multiply and spread as far as the influence of dry hot air was concerned, until they had reached the end of their normal life period and the system at large would continue to feel the effects of such toxins as emanated from these areas, although relieved from a large percentage of those formed in the original and larger focus.

As a consequence, we should expect some fever, acceleration of pulse and respiration, general prostration, etc., to continue until the natural period for the termination of the attack had arrived, and this is exactly what happens. The patient, being relieved from a large degree of the intoxication from the greater bulk of the infective focus, exhibits a marked and immediate improvement, but does not recover entirely until the infection has reached the period of its normal defervescence.

Further, it would be expected that, if the dry hot air applications were discontinued too soon, the germ colonies at the periphery of the original focus of infection would multiply so as to produce some amount of consolidation and an increase in the systemic disturbance. Bedside experience also confirms this expectation.

A final logical inference would be that central pneumonia, where a layer of functionating air-cells interposed between the focus of the infection and the dry hot air apparatus, would fail to respond to the treatment as well as the ordinary form where the consolidated area constitutes a practically solid tissue continuous with the external skin, thus facilitating conduction of the heat; and experience so far indicates that this also is true. In the small number of cases of this variety of pneumonia that have been treated since we have been using this therapeutical agent in its management, the reaction has been much less satisfactory; but even here that benefit was derived was unmistakable.

We can now understand why local thermærotherapy and the administration of drugs like creosote carbonate, are mutually and powerfully auxiliary in the management of this disease. The former acts most efficiently upon the solid mass of consolidation, while the latter, which is active through its property of rendering the pabulum unfavorable to the pneumococcus during its excretion from the blood-current into the air-passages, cannot penetrate into the mass of the consolidation because, among other things, the consolidation has cut off the functional circulation in greater or less degree, but acts most efficiently, therefore, against those most virulent colonies which are located at the periphery of the affected area. By combining the two, however, we are attacking the disease process simultaneously at its most vulnerable points, the strength of the one method being coincident with and supplementary to the weakness of the other.

Now, in closing, while the previously described results will follow local thermærotherapy in the great majority of cases of the conditions mentioned, yet they cannot be expected to obtain in all. Patients who have sustained a sprain or a rheumatic attack, are sometimes in a debilitated condition when the accident occurs, and if their recuperative powers are below normal the general stimulant and tonic influences of the body dry hot air application, of medicinal tonics, or the local stimulation exercised by the various electrical modalities, massage, and the alternating hot and cold douche may have to be invoked. In septic infection when the lymphatics of the joint connecting the affected limb with the trunk are involved, when an unusually virulent type of infection is present, or when the patient's general physiological resistance is low, the body treatment will frequently constitute a necessary element in bringing the case to a satisfactory issue. In pneumonia exhibiting a particularly virulent type of infection, the so-called septic and heart-failure cases, the body treatment offers the patient almost his only chance of recovery. In these contingencies the local treatment is of little use. But its frequent employment in these diseases as ordinarily encountered will hasten the recovery and ameliorate the symptomatology in the favorable cases in a most gratifying manner, will prevent these harassing and dangerous complications from developing at all in many cases, and in all cases our ability to cope with the trouble will be increased by a large percentage.

Apparatus and Technique

As regards apparatus, any make that is portable and capable of generating a heat of 350° F. in twenty minutes and maintaining it there, is practical and therapeutically efficient.

The general principles of application technique are the same for all four of these diseases, viz., a treatment every twelve hours at a temperature of from 350 to 400° F., the duration of the same to be one hour. There will be no difficulty in attaining this treatment duration except in some cases of pneumonia, wherein maintenance of the proper position of the body for so long a period will prove harassing and exhausting to the patient. A treatment of less than half an hour, however, is entirely ineffective for the production of satisfactory results.

TEMPERATURE AND SUNSHINE IN LAKEWOOD, NEW JERSEY 1900—1905*

WILLIAM GRAY SCHAUFFLER, A. M., M. D., LAKEWOOD, NEW JERSEY

THE situation, climate and natural advantages of Lakewood, New Jersey as a health resort have been often described by members of this Association, and it is not my purpose to weary you to-day with a repetition of the same. But I have thought that some data gathered by me and covering the last five seasons, might be of interest and possibly of use.

The Lakewood season begins October 1st and ends June 1st, and my statistics cover these eight months of each year. The thermometric records are compiled from a Draper self-recording thermometer, placed on the northeast corner of my porch. The sunshine record has been of my own keeping, and I have classified the days in three groups: (1) sunshine all day, (2) days partly sunny and partly cloudy, (3) days all cloudy, which includes rain and snow.

The average height of the barometer for the past five years has been about thirty inches, the lowest was on February 17th, 1902, 28.85 — the highest December 1st, 1905, 31.15.

The prevailing fair weather wind from October 1st to May 1st is northwest; after May 1st, east. The average humidity is low, being between 9 A.M. and 5 P.M. about 45 per cent. The hygrometer however often stands for hours at a time at from 25-30 per cent.

The tables of statistics which are appended will perhaps be more interesting to read than to listen to, and I will give you merely the conclusions.

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*Read before the American Climatological Association, May 13, 1906, at Atlantic City, N. J.

Temperature Record

	1900		1901		1902		1903		1904		1905	
	Highest	*Lowest*	*Highest*	*Lowest*	*Highest*	*Lowest*	*Highest*	*Lowest*	*Highest*	*Lowest*	*Highest*	*Lo't*
October.....	74	39	75	39	75	32	85	25	76	28	77	35
Average.	56.5		57		53.5		55		52		56	
November...	72	29	66	24	74	31	64	14	64	22	65	24
Average.	50.5		50		52.5		39		43		44.5	
December...	62	17	65	10	59	18	58	3	54	8	63	18
Average.	39.5		37.5		38.5		30.5		31		40.5	
	1901		1902		1903		1904		1905		1906	
January.....	57	9	48	18	52	16	59	0	57	4	69	13
Average.	31		33		34		29.5		30.5		41	
February....	57	16	60	17	64	7	46	1	46	4	63	8
Average.	38.5		38.5		35.5		23.5		25		35.5	
March.......	59	13	71	23	75	28	83	9	72	13	55	15
Average.	36		47		51.5		46		42.5		35	
April........	85	38	89	38	91	30	78	28	81	30	76	29
Average.	61.5		63.5		60.5		53		55.5		53.5	
May........	82	43	83	42	90	40	92	42	85	41	..	..
Average.	62.5		62.5		65		67		63			

Sunshine Record

	1901		1902		1903		1904		1905	
OCTOBER	*Days*	*Per cent*	*Days*	*Per cent*	*Days*	*Per cent*	*Days*	*Per cent*	*Days*	*Per C.*
Sun all day...........	24	77.4	18	58.0	15	48.4	22	70.9	23	74.2
Sun and clouds........	7	22.6	10	32.2	8	25.8	6	19.6	4	12.9
Clouds...............	0	0	3	9.8	8	25.8	3	9.5	4	12.9
NOVEMBER										
Sun all day...........	19	63.4	13	43.3	21	70.0	14	46.6	19	63.3
Sun and clouds........	8	26.6	12	40.0	7	22.6	15	50.0	11	36.7
Clouds...............	3	10.0	5	16.7	2	7.4	1	3.4	0	0
DECEMBER										
Sun all day...........	18	58.0	16	51.6	20	64.5	10	32.2	17	54.8
Sun and clouds........	7	22.6	8	25.8	6	19.3	13	41.9	9	29.1
Clouds...............	6	19.4	7	22.6	5	16.2	8	25.8	5	16.1
JANUARY	1902		1903		1904		1905		1906	
Sun all day...........	22	70.9	13	41.9	16	51.6	19	61.3	12	38.7
Sun and clouds........	3	9.5	14	45.1	6	19.3	7	22.5	12	38.7
Clouds...............	6	19.4	4	13.0	9	29.1	5	16.1	7	22.6
FEBRUARY										
Sun all day...........	19	68.0	14	50.0	18	62.0	17	60.6	15	53.6
Sun and clouds........	3	10.6	8	28.6	7	24.8	5	18.0	9	32.1
Clouds...............	6	21.4	6	21.4	4	13.2	6	21.4	4	14.3
MARCH										
Sun all day...........	20	64.5	12	38.7	14	45.1	19	61.2	10	32.2
Sun and clouds........	7	22.6	10	32.3	7	22.6	9	29.3	16	51.6
Clouds...............	4	12.9	9	29.0	10	32.3	3	9.5	5	16.2
APRIL										
Sun all day...........	18	60.0	13	43.3	11	36.6	14	46.7	17	56.7
Sun and clouds........	8	26.0	10	33.3	15	50.0	13	43.3	11	36.7
Clouds...............	4	14.0	7	23.4	4	13.4	3	10.0	2	6.6
MAY										
Sun all day...........	21	67.7	22	70.9	19	61.3	19	61.3	..	....
Sun and clouds........	9	29.0	6	19.4	10	32.2	11	35.4	..	....
Clouds...............	1	3.3	3	9.6	2	6.5	1	3.3	..	....

Season Percentages

October 1, 1901, to June 1, 1902	*Per cent*
Sun all day	67
Sun and clouds	17
Clouds	16
Sun whole or part of day	84

October 1, 1902, to June 15, 1903	
Sun all day	50.5
Sun and clouds	29.
Clouds	20.5
Sun whole or part of day	79.5

October 1, 1903, to June 1, 1904	
Sun all day	54
Sun and clouds	27
Clouds	18
Sun whole or part of day	82

October 1, 1904, to June 1, 1905	*Per Cent*
Sun all day	55
Sun and clouds	32.5
Clouds	12.5
Sun whole or part of day	87.5

October 1, 1905, to May 1, 1906	
Sun all day	53.3
Sun and clouds	34.
Clouds	12.7
Sun whole or part of day	87.3

EDITORIAL

SEVENTH ANNUAL MEETING OF THE AMERICAN ROENTGEN RAY SOCIETY

UNUSUAL care has been taken to secure comfortable quarters for the Society and to effect economy of time by having the exhibits, the hotel accommodations, and the meeting room under the same roof, the Cataract and International Hotels at Niagara Falls. The meeting will be held on August 29th, 30th, and 31st.

The preliminary programme indicates that this meeting will be the most instructive that the Society has yet held. The exhibition of Roentgen prints and negatives will be a special feature of the meeting. Anyone desiring to exhibit such should communicate with Mr. J. N. Dachteeler, 1949 Superior Street, Toledo, Ohio. A large exhibit of apparatus will also be collected and will be open at all times except during the scientific sessions. Demonstrations of every form of apparatus employed will be made.

Arrangements have been made for rooms varying from $3.00 per day upward on the American plan, and these should be engaged from Mr. H. W. Isaacs, manager of the Cataract and International Hotel Co. The railroads have granted a rate of one fare and a third, and members desiring to take advantage of this reduction must be sure to *request a certificate* when they purchase their ticket. These reduced rates will apply only on tickets purchased between August 25 and August 31 inclusive, and members should be sure to ask for a certificate, *not a receipt.* These certificates should be handed to Dr. George C. Johnston immediately upon arrival at Niagara Falls.

A large attendance is expected, reservations for five hundred having been made by the hotel management, and it is certain that those who attend will be very glad that they took the trip.

Rupture of the Urethra; Stricture. Treatment by Circular Electrolysis. Cure Persisting After Two Years. (*Paul Blondel*, *Archives d'Electricite Medicale*, *April* 25, 1906). This title gives an accurate idea of the case. The lumen of the stricture before operation admitted a 10 Charriere. Dilatation with sounds failed. Perineal urethrectomy was first performed, with rapid recurrence. Circular electrolysis with a Benique after Desnos's method (negative electrode in urethra 4-5 ma. given during 7-8 minutes) were followed by an excellent and durable result. The method does not, however, claim to insure against late recurrence but is often a very valuable adjuvant to dilatation.

Peripheral Neuritis. (*Francis B. Bishop*, *Journal of Advanced Therapeutics*, *May*, 1906). The treatment of post-febrile neuritis and neuritis due to the toxic or infectious effects of a prior disease is much simpler than if due to alcohol or the use of drugs; for in the latter case we not only have to treat the disease itself, but we also have what might be called a habit neurosis with which to contend. It is fully understood that the use of all agents that have a tendency to cause multiple neuritis, if being used, must be discontinued.

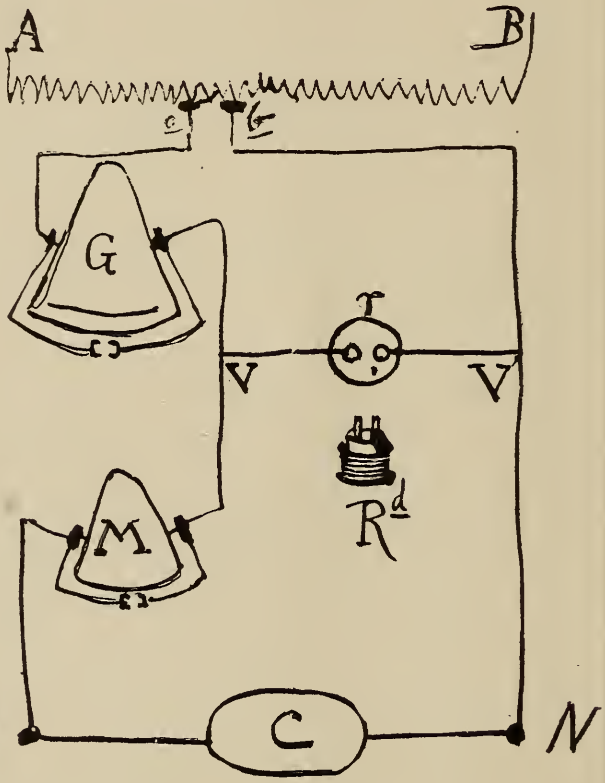
If the patient is up and still able to get to the office Bishop has found the use of the static breeze gently sifted over the body, back and front, while the patient is comfortably reclining, to be of great benefit. If the patient can be made comfortable this treatment should last at least half an hour. Here we get three most important effects. (1) We place the patient in an electrostatic field where pure ozone is generated in abundance, thoroughly mixed with atmospheric air, and this he is compelled to breathe while in this field : this alone plays an important part in the metabolism of the body. (2) The afferent nerves are so gently and continuously stimulated that they in turn cause a stimulation of the cells of the posterior horns of gray matter in the cord, these in turn send their impulses through the commissural fibers in the gray commissure of the cord to the anterior horns and they in turn to the sympathetic ganglia, and together they send nutritive impulses, gently and harmoniously blended, to the blood vessels and to the muscles of the diseased structure as well as to the rest of the body. (3) The patient being in the electrostatic field, has passing through his body in both directions many thousand times a minute, quiet charges of electric currents of very high potential, causing the sluggish cells of the body to make their physiologic exchange, which is so necessary to the restoration and maintenance of health.

After each treatment the patient should be taken home, put comfortably to bed and remain there for at least three hours. He should be allowed to do but little walking—none if it causes distress. This program should be carried out each day. From this treatment alone he has seen cases in the early stages get well, when the symptoms at first indicated a severe attack.

In the more acute and infectious forms of the disease the continuous current with an intelligent technique is more efficacious than high frequency currents and in the later stages, when paralysis has supervened, the faradic current is distinctly useful.

Treatment of Pulmonary Tuberculosis by Currents of High Frequency and High Tension. (*Drs. S. Dubois and Masmonteil, Bulletin de la Societe Francaise d'Electrotherapie et de Radiologie, April,* 1906.) Dr. Dubois considers as very significant the myalgia which is induced by percussion, even light, over muscles beneath which is a tuberculous focus. He considers this the most certain indication for an electrical treatment. When the said myalgia disappears, the lesions are found to be healing up. He uses local applications of strong effluvia with a brush held near enough to the skin to obtain sparks which determine a revulsion as effectually as the actual cautery. The application lasts two minutes and is slightly painful; it is followed by a 10-15 minutes auto-conduction treatment. The apparatus is the double Oudin resonator. The current is supplied by a large Rochfort transformer (20-inch spark) and the high frequency is obtained with a Rochfort spark-gap and four Leyden jars. Five cases are reported. Although the patients are still under treatment, it must be stated that all improved wonderfully. A special point is of interest, viz., effluvation can provoke hemoptysis.

Arrangement for Measuring the Resistance of the Body without Special Apparatus. (*H. Guilleminot, Archives d'Electricite Medicale, April* 10, 1906). This device does not claim any superiority over the Bergonie ohmmeter, but may be useful in order to estimate approximately the resistance of the human body with nothing more than the ordinary electrotherapeutic apparatus. If the switchboard has two milliamperemeters, the device is as follows:



AB is the ordinary reducer of potential, *a* and *b* are the poles of said reducer between which we can establish a difference of potential from 0 to the maximum. G is the first milliammeter recording from 0 to 100 ma. and M is the second recording from 1 to 5 or 10 ma. with 1-10 subdivisions for electrodiagnostic or other purposes. From the conductor connecting both milliammeters, there is a shunt which we will lead to the conductor connected with the other pole of the reducer *b*N. In the course of this shunt, let us place a resistance plug *r*, on which we shall adjust a known resistance such as R^d (being, for instance, equal to 50 ohms).

When we send a 2 ma. current through the milliammeter M, we shall read on the milliammeter M (which bears a special graduation in ohms as well as milliamperes) the resistance of the body placed between P and N, plus the known resistance of M.

Introducing an invariable resistance (R^d) at *r* and the resistance of the human body (R^c) at C, the current I^t indicated by the milliamperemeter G will be the total of the current (I^d) passing through the resistance D and the current (I^c) passing through the resistance C. The last named current is measured by the milliamperemeter M. The volt controller is to be adjusted so that the current I^c shall be exactly 0.002 amperes.

Then the following calculation is made :

$$I^t = I^d + I^c = I^d + 0.002 \text{ am.}$$

but because $I^dR^d = V\text{-}V^1 = I^cR^c$ it follows that

$$I^d = I^c \frac{R^c}{R^d} = 0.002 \text{ am. } \frac{R^c}{R^d}$$

whence

$$I^t = 0.002 \text{ am.} + 0.002 \frac{R^c}{R^d}$$

whence finally

$$R^c = \frac{(I^t\text{-}0.002 \text{ am.})\ R^d}{0.002 \text{ am.}}$$

I^t is shown by the milliamperemeter G and I^t-0.002 ampere is the number of milliamperes diminished by two.

If R^d is fixed the resistance R^c is merely a fraction of I^t and the milliamperemeter G may be graduated directly in ohms indicating the resistance of the human body at C.

If the switch board has only one milliammeter, the device may be modified so that it will work, but gives inferior results as compared with those obtained with two ma. meters.

RADIODIAGNOSIS

What Influence has the Use of X-Rays had upon Treatment of Fractures and Dislocations? (*J. Lynn Thomas, British Medical Journal, May* 5, 1906.) After describing roentgenography of the bones of the extremities and experiments to determine the distortion of parts due to faulty position of the plate, object, and tube, the author notes his conclusions upon the subject as follows :

" 1. No new methods of treatment have been introduced since or due to the discovery of X-rays.

" 2. The ordinary symptoms of fractures and dislocations are sufficient to form a correct diagnosis in the vast majority of cases, and X-rays are unnecessary.

" 3. In injuries to bones or joints which are obscure from any cause the aid of X-rays should always if possible be obtained.

" 4. The value of X-rays *alone* in forming opinion with regard to treatment is *nil*.

" 5. X-ray photographs should be obtained when doubt exists with regard to reduction of a recent dislocation; in old dislocations they do not assist us in deciding upon any line of treatment.

"6. X-rays are of no value in forming opinion as to the progress of the process of repair in recent fractures, and they are also useless in forming opinion as to the usefulness of a limb; their value is limited to the determination of the mechanico-pathological conditions of the fragments.

"7. The evidence afforded by X-rays is deceptive, misleading, and should only be submitted to and acted upon by those who understand their value."

(It is hardly necessary to state that all of the above conclusions are not accepted by most of the best Roentgen diagnosticians.)

The Examination for Renal Calculus by Means of the X-Ray. (*F. H. Jacob, Archives of the Roentgen Ray, March,* 1906.) Renal calculus does not always show typical symptoms, and the diagnosis may remain in doubt even where a calculus of considerable size is present, unless the patient is subjected to a Roentgen examination at the hands of a competent operator. Jacob places the patient face down on a canvas-covered couch, the tube is placed beneath the couch, the plate on the patient's back, and a feather pillow under the patient's abdomen. The patient is instructed to breathe violently as long as he can and then to rest; he will then breathe very quietly for several minutes, during which time the picture is made. The exposure varies from three to five minutes according to the thickness of the patient, and the pressure method is employed in unusually stout patients.

Fæces and calcareous glands both cast good shadows, and may give rise to confusion. If a patient is purged well before the examination the fæces shadows are eliminated. Calcareous glands, however, are hard to differentiate, but they are not usually in the position where one expects to find the calculus.

In a man of thirty-four, who complained of aching in the left loin, but had never suffered from colic, and whose urine showed oxalate crystals and a few red-blood cells, the roentgenogram showed a moderate-sized stone, which was removed. In a patient with bloody urine, constant pain, except when lying down, but no colic, a roentgenogram showed numerous stones in the left kidney, and sixteen calculi were removed by operation.

In a boy aged twelve, complaining of pain in the left loin and the urine showing a trace of albumen and a little pus, the roentgenogram showed three shadows in the left loin. An operation, however, revealed an absence of the kidney on the left side and the shadows were due to three small calcareous glands in the mesentery.

Concerning Shadows in the Roentgen Negative which may be Mistaken for Ureteral Stones. (*Dr. Max Reichmann, Fortschritte auf dem Gebiete der Rontgenstrahlen, February* 22, 1906.) Reichmann reports a case in which he made an examination and found five calcareous concretions upon one side of the pelvis and four on the other lying in the region of the tuberosity of the ischium. He then passed a metallic bougie into the ureter and found that the shadows lay about two centimetres outside of the line of the ureter, and therefore were certainly not ureteral calculi. He thinks they may have been phleboliths.

A Very Simple Indicator for Locating Foreign Bodies Radioscopically. (*L. Kocher, Bulletin de la Societe Francaise d'Electrotherapie et de Radiologie, April,* 1906). Kocher's apparatus consists of a brass ring 15 centimetres in diameter provided with four needles which may be pushed together in the middle or withdrawn: also two semi-circular meridians from whose intersection a fifth needle may be pushed to the center. Looking through the roentgenoscope this apparatus is moved into such a position that the normal line (i.e. perpendicular to the cutaneous surface) represented by the fifth needle is directly in line with the foreign body. Four points of the circumference of the ring are marked on the skin and a fifth one at the center. The foreign body is to be sought in a line passing perpendicularly through the central point. This normal line may be more exactly indicated at any stage of the operation by placing the indicator in position. It can all be sterilized.

RADIOTHERAPY

Small and Large Induction Coils. (*Prof. Wertheim Salomonson, Archives d'Electricite Medicale, April* 25, 1906). From a very complete theoretical study of the question, the writer concludes that, practically, large coils do not have all the advantages theory gives them over small ones. The latter have a relatively greater useful co-efficient and he who has a small coil need not hurry to purchase a large one.

The Value of the Roentgen Rays for the Treatment of Lymphosarcoma. (*Max Cohn, Berliner Klin. Wochenschrift, No.* 1, 1906). The following technique was made use of. The Roentgen tube was enclosed by a lead glass globe which is impervious to Roentgen rays and which has an opening of about the size of a silver dollar. Through this lumen the rays pass to the tumor by means of a tube which is also impervious to the rays and which, with its open side, is placed upon the skin. By pressing this tube against the skin we obtain an anemia of the skin.

The author's patients had all had surgical, medicinal, and Roentgen treatment so that there can be no doubt about the diagnosis.

Case I. Mr. B. 57 years old. 15 months ago skin disease on the right foot, then swelling of the whole right leg. Three months later on both sides under the lower jaw glandular swellings which rapidly increased. By and by swallowing became difficult, respiration heavy. Dyspnoea became worse, danger of suffocation at night. Patient weak and anemic.

In this condition patient underwent an operation, the tonsils, which were of the size of a small apple, were as far as possible extirpated with scissors. A few days later he was referred to me on account of the neoplasms in the neck. Patient was so emaciated that he had to be carried to the radiation. The submaxillary line is filled up with tumors of the size of a hazel nut to that of a hen's egg. Axillary and inguinal regions free. Spleen not enlarged. Blood normal, hemoglobin 50 per cent.

After two weeks' treatment the glands at the neck are considerably smaller. After six weeks all glandular swellings have disappeared. General condition excellent. Hemoglobin 70 per cent. After an interruption of two months during which time patient was in a bath the treatment is continued up to the day of the writing. There appeared some tumors in both inguinal regions which disappeared after a few radiations. No glandular swellings for the last seven months. Toward the end of the treatment a moderate swelling of the spleen which still exists. No feeling of pressure in left side. The histological diagnosis of the extirpated tonsils was lymphosarcoma, clinical diagnosis lymphoma malignum.

Case 2. Mr. M. 39 years old. Two and one-half years ago on the left side of the neck a tumor was noticed which at first slowly, then rapidly, increased in size. After about one year the tumor was the size of the fist. Patient was operated on but a radical operation was impossible. Clinical diagnosis lymphosarcoma, histological diagnosis lymphoma. Immediately after the operation recurrence at the same place. A cure of several months in Roncegno without any success. The tumor grew more rapidly.

Roentgen treatment was begun in May, 1905. After four weeks the tumors have entirely disappeared, nevertheless daily radiations for another four weeks. Patient is now, 5 months later, perfectly well, weighs 200 pounds, no symptom of any swelling of the glands.

Cases 3 and 4 show similar symptoms and similar results.

Case 5. This patient is discharged by the author against his wishes, because the author thinks that the case is too far gone and an improvement cannot be expected.

Radiotherapy in Uterine Cancer. (*Stephane Leduc, Archives d'Electricite Medicale, April* 10, 1906.) A woman of 56 years had a localized cancer and was operated on under favorable circumstances by a skilled surgeon : another one, 68 years old, was adjudged inoperable and treated by X-rays. In the first, the cancer recurred after three months and she died soon : the second one is still in perfect health.

The Indications for Roentgen Ray Treatment in Skin Diseases. (*C. Bruhns, Berl. Klin. Woch.* 6, 1906.) This article contains nothing new. The author's conclusions are that (1) our experience in Roentgen therapy of skin diseases shows that in a number of skin diseases we obtain excellent results where our other methods of treatment were either insufficient or consumed much more time. These good effects of Roentgen radiation are observed in chronic, dry eczema, neurodermitis, circumscripta chronica, pruritus localis, lichen ulcer verrucosus, favus, sycosisparasitaria and non parasitaria, chronic furunculosis nuchæ, acnekeloid, psoriasis, hyperidrosis, multiple juvenile verrucæ, partly in malignant tumors, in mycosis fungoides and rhinoscleroma. In some other skin affections, lupus erythematosus and others, we see occasionally, but much less regularly, good results of Roentgen treatment. (2). Under careful application injurious effects of the Roentgen rays can be avoided so that this method of treatment can also be recommended in relatively insignificant diseases of the skin.

Roentgen Treatment of Tubercular Arthritis and Osteitis. (*D. Vassilides, Archives d'Electricite Medicale, April* 25, 1906.) Report of four favorable cases. Technique is as follows: Four to six treatments are given every week. Every one makes the skin absorb 1.5 or 2 H. To regulate this absorption, the author first determines the time necessary with a given tube to have 5 H. and applies the radiation only during one-third or one-fifth of said time. Verifications must be frequent.

Alopecia Premature Idiopathica Treated by the X-Ray. (*Dr. Bordet, Bulletin de la Societe Francaise d' Electrotherapie et de Radiologie, April,* 1906.) Report of the case of a man thirty-three years old in which roentgenization was quite successful. The alopecia was localized to the vertex. Treatment was given with a Chabaud tube with osmo-regulator. Localized. Distance from the anticathode to the skin six inches. Continuous current, six amperes at 52 volts, 14-inch spark coil. Contremoulins-Gaiffe interrupter. Rays No. four or five Benoist. Each region of the alopecia received only a single treatment of about two minutes.

Arthritis Deformans and X-Rays. (*J. M. Anders, J. Daland, and G. E. Pfahler, The Journal of the American Medical Association, May* 19, 1906.) Anders, Daland and Pfahler report two cases of arthritis deformans successfully treated with the X-ray. The exposures were made three times a week with about one milliampere of primary current for fifteen minutes. Internal treatment and massage were also employed. While the report is made as a preliminary one only, the authors say that they consider the method a valuable one, the rays stimulating the metabolism of the affected joints. This should be taken advantage of and massage and passive movement added to assist in the removal of the exudate.

Radiotherapy in Experimental Tripanosomiases. (*Drs. de Nobele and Goebel, Archives d'Electricite Medicale, April* 10, 1906.) Experimenting on mice, guinea-pigs and rabbits, the authors conclude decisively that even very high doses of Roentgen rays are absolutely without effect on tripanosomiases, therefore no results can be expected from roentgenization in sleeping sickness.

Method and Apparatus for Practically Studying Absorption in Radiotherapy. (*L. Benoist, Archives d' Electricite Medicale, April* 10, 1906.) The absorption and the transmission of X-rays by different substances are selective. If we consider a body of definite composition and of a known thickness, the fraction of the radiations transmitted by that body depends on the composition of the incident bunch of rays, and on the thickness of the body, said fraction being, for a given heterogeneous bunch, a complex exponential function of this thickness.

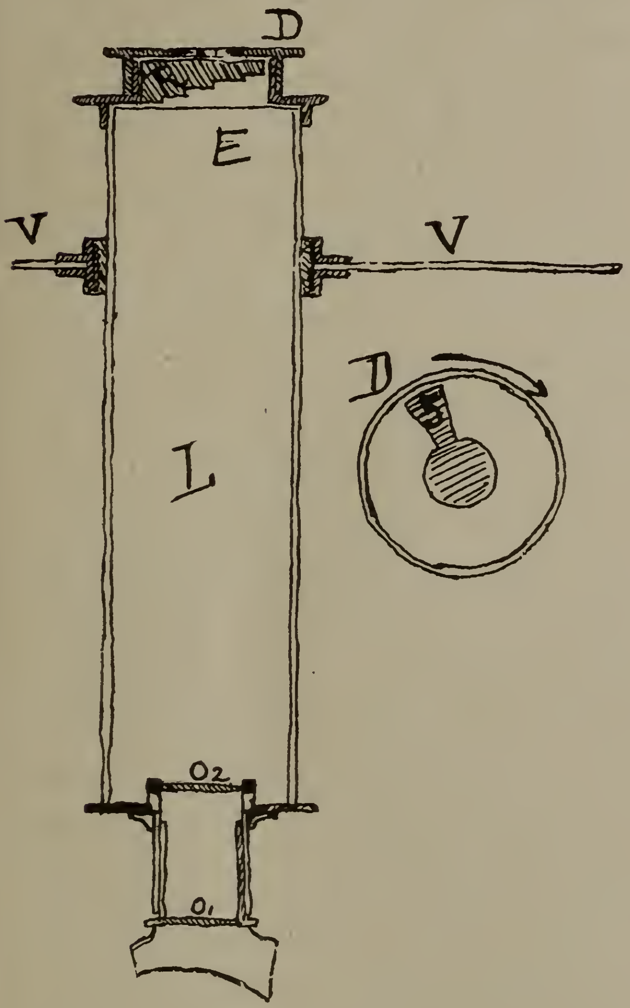
If we consider successively the units of thickness traversed by the rays, we find that this fraction is not the same for all the units. It grows from unit to unit, at first rapidly, and later more slowly and tends towards a constant value which is attained for the last units when the total thickness of the body is sufficient. So that the transmission of a body may be characterized by two coefficients: (1) the average transmission coefficient, that is the *average* fraction transmitted by each unit, of thickness: (2) the *limit* transmission coefficient, that is the fraction transmitted by the last units of a body thick enough to realize a complete selection among the rays and transmit therefore only homogeneous rays. The calculation of this latter coefficient may be long, but is very simple. Benoist's method is as follows:

Let us suppose a photographic plate submitted to Roentgen radiations passing through a body which we want to study. It receives a certain portion of the radiations emitted. Let us send on other parts of the plate known fractions (1-10, 2-10, 3-10) of the same total radiation. We shall obtain imprints which we shall have only to compare one with another to know whether the transmitted fraction is, for instance, 3-10 or a fraction between 3-10 and 4-10. To obtain those known fractions, we must maintain the tube in the same working condition during the whole experiment. Let us divide the total time of exposure, say one minute, into ten equal parts of six seconds each, and by displacing an opaque screen, let us expose successively on the free margin of the plate ten stripes, so that the time of exposure will be six seconds for the first, twelve seconds for the second, eighteen seconds for the third, etc. Then we may compare the imprints and see to which one the imprint of the body corresponds.

A very simple modification of the method enables us to obtain the fraction in hundredths instead of tenths. During the experiment we shall control the modification in radiochromometric degree induced by the passage through the body, with two radiochromometers, one placed on or under the body, the other one next to it. Benoist has constructed a special frame for such experiments.

Magnifying Radiochromometer. (*L. Benoist, Archives d'Electricite Medicale, April* 25, 1906.) This consists in a combination of lenses forming a short-focused Galilean telescope magnifying about two diameters and enabling one to focus exactly upon the fluoroscopic image E of the radiochromometer R. Said optical system on account of its magnifying power and its well calculated field allows the operator to see the whole of the magnified image, and it is consequently easy to compare the shade of the central silver disk with that of each of the twelve aluminum sections.

The lead diaphragm, D, which covers (inside?) the radiochromometer has an aperture which discloses exactly one peripheral section as well as the central disc. The rotation of this diaphragm enables the operator to go quickly through the gradation of the different sections and to stop at the section with a shade corresponding to that of the central disk.



A simple device forms, so to speak, an automatic register, and gives immediately the radiochromometric degree of the observed X-rays. Turning the diaphragm around a number appears through the window, and that number is the degree of penetration of the rays. The fluorescent screen can be unscrewed and may be regenerated by exposure to sunlight. And last a glass disk, V, fastened to the telescope protects one from the harmful influence of the X-rays.

Results of the Radium Treatment of Cancer. (*Catharine MacFarlane, American Medicine, April,* 1906.) Dr. MacFarlane reviews briefly the results obtained by different men in the radium treatment of cancer, and concludes her article as follows :

"To summarize, there are reported 13 rodent ulcers cured, 14 epidermoid cancers cured, 1 malignant wart cured, 11 cases of cancer of the esophagus slightly improved, 1 sarcoma cured, 27 carcinomas unaffected, 1 malignant wart unaffected, 1 malignant mole unaffected, 1 rodent ulcer unaffected.

"The advantages of radium are its portability, and the ease with which it can be applied and accurately localized. From the foregoing summary we may conclude that it has a distinct, altogether very limited, field of usefulness in the treatment of malignant disease.

"Its action is similar to that of the Roentgen ray, but much weaker. It is preferable to the Roentgen ray in the treatment of small rodent ulcers, and is available for use in inaccessible cavities."

MECHANOTHERAPY

Massage in Parametritis, Perimetritis, Salpingitis and Oophoritis. (*Gustav Norstrom, New York Medical Journal, May* 12, 1906.) The term parametritis is applied to inflammation of the pelvic connective tissue while the term perimetritis is applied to a similar condition of the pelvic peritoneum. Both may be due to the same cause but their pathology and complications differ. They do not yield to the same form of treatment, for perimetritis forms new tissue and causes adhesions which are likely to become organized and are made to disappear only with difficulty.

Parametritis is often due to simple infiltration of the connective tissue, a true œdema, and fibrous transformation corresponds to a more advanced stage. The extent, location and consistence of the exudates vary greatly. Some completely fill the pelvis, some are firm and thick. Some are located so high as to be almost unapproachable from the pelvis and some are located on the side of the uterus in the broad ligament or in Douglas' cul-de-sac.

The consistency depends on the duration of the process. Shortly after labor is the most favorable time for massaging, for at this time the exudate partakes of the general softening of the pelvic tissues. But when the production of almost fibrous tissue has occurred the results will not be likely to be satisfactory and secondary retraction may occur with increase in hardening of the exudate and displacement of the uterus.

In parametritis this treatment should never be begun until the acute stage has entirely subsided, or as long as the patient has chills, rise of temperature, or increased pulse rate. Even after the acute stage has passed it is occasionally necessary to wait a while because secondary suppuration may occur, from some cause, in the exudate.

Prolonged hot irrigations as recommended by Emmet, while sometimes productive of good results, do not meet the needs of cases and repair does not seem to be stimulated. Under massage the repair is often very rapid. It is probable that any beneficial effects from hot irrigations are due to the hyperemia produced and are therefore like the menstrual function in results. Where the exudate is fibrous or cicatricial in character the only remedy that will prove at all efficacious is massage with vigorous stretching and with this treatment surgical interference will rarely be required.

In perimetritis the results of massage are not as satisfactory as in parametritis because of the plastic nature of the exudate that tends to form new tissue. Adhesions of the uterus, tubes and ovaries to adjacent structures are common. These adhesions are often well borne by the patient and may be difficult of diagnosis by the physician. Sometimes they include cysts that may be broken by manipulation but this should never be done because of the uncertainty as to the character of the contents. Where adhesions are torn the result is not always bad but the conservative method will attempt the gradual stretching rather than the rupture of them. Brandt's method of procedure is the best that has been advised and the work should be done without anesthesia.

It is not to be supposed that constrictions and bands do not cause impairment of the circulation of the uterus with resulting congestions and attendant symptoms. As a result of this impairment of the nutrition of the uterus ulcerations may occur and are usually very intractable. But when the exudate or adhesion is removed the ulcerative process ceases rapidly without other treatment. When inflammatory exudates have not been removed the ulcerations have a marked tendency to recur but not when the circulation has been relieved.

In disease of the tubes we have a process that is secondary to endometritis and that is persistent in nature. The inability to diagnose the exact material contained in the dilated tubes makes manipulation an unsafe and, except where the tube is soft, an unsatisfactory treatment.

In oophoritis there is usually enlargement and tenderness that is relieved by the proper manipulation. The œdema is always reduced and even where there is hardening of the structure resolution is common.

Treatment of Recent Sprains and Contusions. (*Robert McEwen Schauffler, Journal of the Kansas Medical Society, May,* 1906.) The inconsistency of the methods by which the physician and the athletic trainer handle sprains has often puzzled the author. The physician carefully immobilizes an injury where the skin is not broken whereas the athletic trainer provides immediate and repeated massage, supports the parts with bandages, and prescribes continued, but light, exercise. He suggests that the logical, early treatment of sprains should be as follows: "Early massage to diminish the exudate and improve the circulation seems strongly indicated. This should be toward the body and from the proximal side of the swelling progressively across it. We aim to unload the blood vessels at a distance up the limb, then to rub down the upper edge of the swelling, then advance to the center, etc. We then need support, which may be afforded by a flannel bandage or, better, by some form of elastic bandage. This may be replaced, often early and nearly always later, by appropriately applied strips of rubber adhesive plaster. Over the contusion in the soft parts and where applied to keep from swelling, the strap should be at 'fascial tension,' i. e., about the tightness of the fascia over a large muscle. Only when it is desired to relieve a torn ligament by outside strapping should the plaster be tightly drawn and in that case it should, of course, never completely encircle the limb. Hot compresses may be used early or, to still greater advantage, dry heat in an appropriate bake oven, if the part be a limb. The temperature can be pushed up to 3c0 degrees F. if proper precautions are taken to absorb all the moisture. The advantage of baking in old joint lesions is well known. When the apparatus is at hand it may be advantageously employed in most recent cases.

"Passive motion should be instituted at once by the surgeon. Active motion is the point on which the most courage as well as judgment is required. In muscle bruises, after support, this is all-important. It should be light, but of good range, and persisted in, in spite of moderate pain. The whole treatment of a sprained ankle by the 'army strapping method' fails unless you make the patient walk from the first; carefully, to be sure, and in short installments, with the foot elevated between times; but walk they must, or the circulation becomes sluggish and the new treatment fails. A large joint effusion is the only contra-indication to early active motion, except fracture and some kinds of fractures do well under the ambulatory treatment after a few days of rest. We may continue massage through the strapping, or use an elastic bandage and remove it for rubbing, baking and so on. If you must use medicine, a belladonna-ichthyol ointment may be applied under the bandage. In the latter stages electricity is of distinct value. If the pain be severe, one early exposure to the Finsen light or the X-ray sometimes gives almost instant relief. If used a few moments after the injury, the Finsen light, or even an ordinary violet ray from an electric bulb, sometimes seems to prevent swelling."

Indications for Massage in Neuritis and Polyneuritis. (*Dr. Kouindjy, Journal de Physiotherapie, April* 15, 1906.) The literature of the question is very scanty. The indications are based on the origin of the disease. Massage generally gives good results. It must be associated with motor re-education. The duration of treatment is in direct relation with the cause of the disease. Only when the cause is permanent does massage meet with a failure, or when the operator is incompetent.

Mobilization of the Lower Extremities in the Treatment of Phlebitis. (*Dr. Berne, Journal de Physiotherapie, April* 15, 1906.) Too much has been said about massage in phlebitis, and too little about mobilization which, according to the writer is more important than the former. Treatment ought not to be begun before one month after the last rise of the temperature; tarsal and metatarsal articulations will be first mobilized, later larger joints. And last, much later, gentle massage will be resorted to and the patient progressively trained to resume the standing position.

CLIMATOTHERAPY

The "Home Sanatorium" Treatment of Consumption. (*Joseph H. Pratt, Johns Hopkins Hospital Bulletin, May,* 1906.) "The problem of tuberculosis is in its most important aspect a home problem. The vast majority of all tuberculous patients must be treated in their homes." One has but to refer to the conditions in any state or locality to realize the force of Osler's words. There are at the present time, according to the author of this paper, about 14,000 consumptives in the State of Massachusetts. For these 375 beds are available. In other words about three per cent can be treated in the state sanatorium. As consumption is very largely a disease of the poor, it is evident that most of the cases comprising the remaining 97 per cent must be treated in their homes if they are treated at all. A knowledge of these hard facts has led the writer to put to the test the methods used by Minor of Asheville, N. C., in carrying out the hygienic dietetic treatment among private patients outside of a sanatorium.

Pratt's cases are from the poorer classes of Boston, most of them being referred from the out-patient department of the Massachusetts General Hospital. The class was organized

July 1, 1905. Admission is not limited to favorable cases. In fact, only two of the patients are in the incipient stage of the disease.

The requirements for admission are as follows: (1) A careful clinical examination of the patient followed by the examination of the sputum or the use of tuberculin to confirm the diagnosis; (2) The patient must agree to obey the tests implicitly. He must give up all work, live an out-of-door life and abide by all the restrictions. A careful clinical history is then entered on the record-book and the patient is duly initiated as a member of the class.

Once a month the lungs and sputum are re-examined. The patients are visited by the nurse as soon as they enter the class. In some cases before admittance the nurse is sent to discuss the question with the family to determine whether it will be possible to carry out the open-air treatment in the candidates' homes. If there be no roof, balcony, piazza, or yard available for the rest treatment in the open air, the family is required to move to a tenement that will enable the tuberculous invalid to spend the entire day and night out of doors. Friendly assistants have spent much time in seeking satisfactory tenements for the members. A careful examination of the conditions and surroundings is made by the nurse and a detailed report made to the physician in charge. Subsequent visits are made by the nurse as required.

On January 5, 1906, the class numbered fifteen members; all but one were sleeping out of doors and this one sleeps at present with his head out of his bed-room window. One of the class sleeps in a balcony, the others in low-priced tents placed on the roof or on the ground near the house. Except the time taken for meals, bath, and exercise, the entire day is spent in the recumbent or semi-recumbent posture.

The prescribed diet consists chiefly of milk, bread, fruit, butter and oil. Most of the patients drink two to three quarts of milk a day. For the first few weeks no exercise is allowed and later only when the temperature is normal the entire day. The patient begins by walking five minutes in the morning and five in the afternoon. It is required that a watch be carried and the exact duration of the walk recorded. If a rise of temperature occurs or if the patient becomes tired the amount of exercise is diminished. If the patient continues to improve the exercise is gradually increased. (It is presumed that the patients are supplied with clinical thermometers although this is not stated.)

An important aid in maintaining a strict hygienic regimen is furnished by the individual record-book which each patient is required to keep. Every detail of the day is recorded: the food eaten, milk and oil consumed, number of hours out of doors, temperature, pulse-rate, and quantity and character of expectoration. This serves to impress upon the members of the class the importance of attention to detail in treatment. It has not appeared to depress their spirits or to cause morbid introspection. A weekly meeting of the class has been held at which the record-books are inspected, and the patients' weight, temperature, etc., observed. The author has been financially aided in his work by Emmanuel Church which has paid for a special nurse, furnished tents, reclining chairs, and all other necessary supplies. A nominal fee of $2.00 per month has been required from each patient but this has in some instances been remitted and in a few a small amount of money loaned. The total expenses of the first six months ending January 1, 1906, were $513.00.

Old tuberculin has been used in a number of cases with apparent benefit. Drugs have been used only for special conditions such as constipation or diarrhoea. A few patients have taken creosote. Hydrotherapy has been found of value in every case. Full baths, local baths, and chest compresses were the procedures selected.

Results

Of the nine patients who have been members of the class for three months or more all show a gain in weight, the average being 19.4 pounds, and all but two improvement in their general condition. One patient's weight has increased 40¼ pounds. In five of the nine cases the disease has been arrested. (The term "arrested" is used in the sense in which it is employed by the committee on Nomenclature of the National Association for the study and prevention of Tuberculosis in their proposed classification). In conclusion the author presents a weight table followed by an abstract of the clinical records of each case.

The results achieved by the writer are full of significance. The number of cases has been small and the time of investigation very short but they indicate a remarkable degree of success under conditions within reach of a far greater number of consumptives than all other methods combined. Minor's and Pratt's pioneer work is deserving of wide emulation. Almost every general practitioner in the country no doubt has one or more tuberculous cases which would be benefited by the adoption of this method in whole or as nearly so as possible.

Transactions of the American Climatological Association, 1905. (*Octavo Vol., XXI.*) The twenty-first annual session of the American Climatological Association was held at Detroit, June 29-30, 1902. The present volume is the outcome of the scientific work of the meeting. Including the president's address the book contains nineteen papers with discussions on some of them. The contributions as a rule are of a high order of scientific merit. Several are of great practical value. The brief address of the president is a thoughtful and judicious summary of our present day climatic ideas and is pregnant with the true note of progress in this field. Too much praise cannot be bestowed upon the painstaking and illuminating contribution "Conditions in Panama" by Drs. Curtin and Risley of Philadelphia. This paper, based upon a visit of the distinguished authors to the Isthmus as delegates to the fourth Pan-American Medical Congress, covers forty-three pages and is accompanied by twenty-seven photographic illustrations and an excellent map of the route of the Panama Railway. To the seeker after information regarding the climatology, diseases, sanitary conditions and hospital facilities of the canal zone this paper will prove exceedingly helpful. The succeeding papers are comparatively brief but most of them will repay reading. Abstracts of several have already appeared in **The Archives.** The paper entitled "The Permanency of Results in Pulmonary Tuberculosis" by Dr. F. N. Pottenger of California forcibly illustrates a fact which is only just beginning to be appreciated by the profession at large, viz., that tuberculosis is a comparatively hopeful disease in the early stages, that a good percentage of fairly advanced cases may recover, and that even well-advanced cases are not necessarily hopeless. The paper further shows that cases that are *bona fide* cures, i. e., in which there is a return of the normal weight and vigor and a disappearance of symptoms, physical signs, and tubercle bacilli may be as reasonably expected to remain free from tuberculosis as a recovered case of typhoid or of pneumonia may expect to escape a return of those diseases.

A useful feature of this volume is a complete index of the transactions of the Association from Vol. I to Vol. XXI.

We congratulate the Association on its good and useful work. Its annual meetings and volumes of transactions serve to maintain professional interest in a most important and valuable branch of the healing art. Recent developments in pathology, in bacteriology and in clinical medicine have in no wise eliminated climatotherapeutics as a factor in the treatment of disease. Rather have they given it wider scope in teaching us that home climates in which most of our patients must continue to abide, may, by wise and timely application, be as efficacious in many cases as the climates of far off and inaccessible resorts. It cannot be denied that more persons are being treated climatically at the present day than at any previous period of the world's history. There is every reason then for the existence of the American Climatological Association. We wish for it a continued career of growing usefulness and importance.

DIETOTHERAPY

Heart Failure as the Result of Deficient Food. (*Alexander Haig, of London, England. Medical Record, May* 26, 1906.) During the last few years, Haig has seen many instances in which deficient nourishment had led, directly or indirectly, to more or less marked heart failure. A well nourished patient may starve for thirty, or even sixty days without serious signs of collapse, if due care is exercised. The essential structures, the muscles of the heart, and the cells of the brain are nourished at the expense of the other structures. If there is a constant deficiency of food, then comes a time when not only the less important tissues suffer, but the heart muscles and brain cells also begin to suffer with them. After weeks, months, or it may be a year or more, then comes a time when the muscles of the heart participate in the general malnutrition and anæmia, and this is, or may be, a rather serious condition, because the actual continuation of life depends from moment to moment upon the entire functional integrity of that organ. There have been observed some very marked cases of cardiac failure as the result of the debility and anæmia produced by prolonged underfeeding.

Since the opinion is gaining ground that it is desirable to live on a smaller quantity of albumen than has hitherto been generally acknowledged as sufficient, it is a duty to draw attention to such observations, because people may be led to underfeed themselves, and thus enter the danger zone, where their hearts may either fail directly, or do so when exposed to special strain or stress.

The signs of heart failure are a prolonged capillary reflux on the front of the chest at the heart level with a disproportionately lowered blood pressure; increased action of the heart, showing from five to thirty extra beats in a minute; some decided increase of the cardiac dullness as measured on the front of the chest, with more or less displacement of the apex beat to the left, and a prolongation, or may be a reduplication, of the first sound over the septum between the ventricles, and to the right of the apex beat.

Case I. A man, between 30 and 40 years old, who had been strong and athletic, had adopted an altered diet for a year or two without sufficient care about quantities. The assumption is absolutely unfounded that if one eats to the limit of appetite he will probably eat enough. One who has been accustomed to a diet of small bulk, such as meat, cannot all at once take the increased bulk of bread-stuffs, rice, etc., necessary for his nutrition. After a year or more of this defective nourishment he one day exerted himself more than usual in lifting a heavy weight. He was seized with a sudden pain in the epigastrium, and with more or less serious and prolonged collapse, from which, however, he gradually recovered. He was put on an ample diet while fluids were reduced to a minimum so as to diminish the driving work of the heart. Rest was advised, and a slow increase of exertion. After a few months he recovered, but it is doubtful whether a heart which has been strained like this is ever quite as good as it was before.

Case II. An anæmic woman had altered her diet without sufficient supervision and owing to general delicacy of health and distaste for food, decidedly underfed herself. Repeatedly she had feelings of impending collapse. She became pregnant, and very unwisely undertook considerable exertion in house hunting and furnishing. Throughout the later stages of the pregnancy there were very decided signs of strain on the heart in more or less marked dropsy. No doubt pregnancy is always a strain on the heart, but her heart would probably not have failed, even though severe exertion had been added on to the condition of pregnancy, if she had not been defectively nourished for some years.

Case III. A man placed himself on an approximately uric-acid-free diet, without definite medical advice. He suffered slightly from rheumatism and deliberately underfed himself that the rheumatic poisons might, as he thought, be the more quickly eliminated. After a year or 18 months he had marked signs of collapse after taking some depressing drugs, and became extremely nervous, suffering also from insomnia. His pulse was rapid, the relation of the capillary reflux and the blood pressure was disturbed, the first sound of the heart was prolonged and at times reduplicated, and the area of the heart dullness was slightly increased. The indications for treatment were to diminish the work of the heart, to increase its nourishment, and to administer a tonic.

Case IV. A doctor took a " cure " for headache at the Lahmann Institute near Dresden. After one or two weeks the headache departed, but he got in its place very marked signs of heart failure. During this time he had lived largely on salads, which by their bulk prevented him from taking sufficient of the more nourishing foods. He had thus exchanged a slight illness for a more severe one, as high blood pressure headache is rarely dangerous to life, while heart failure is so.

More or less alteration of the first sound of the heart is a common symptom in all cases of raised blood pressure, especially where the heart is beginning to fail, and when it is failing owing to defective nutrition we may find a very decided reduplication over the septum of the ventricles.

The treatment of gout by low diet with an excess of fluids, especially if the use of flesh, tea and coffee are continued, may be followed by impairment of cardiac action, the uric acid, which causes the resistance in the circulation, being constantly poured into the system, while the excess of fluid maintains a very high blood pressure, and increases the work of the heart and its tendency to dilate.

The poorer classes of the population and the unemployed undoubtedly suffer especially during winter from an insufficiency of food. The nutrition of their hearts often suffers, they are said to " lose heart." Many of these men become permanently debilitated, lethargic, deficient in muscle and mind. They turn to stimulants, and become in many instances chronic loafers, beggars, thieves or chronic invalids.

Other symptoms of deficient nourishment are anæmia and subnormal temperature.

It is dangerous for any one to produce less than three grains of urea per pound of body weight per day, or to take less than the albumen requisite for this production, namely, nine grains per pound daily. The body weight to be used in this calculation is that of the original structure of bone and muscle. The weight of the adipose tissue should be deducted. Active people may require a little more than nine grains, sedentary people may require less.

No one, active or sedentary, should display constantly anæmia, subnormal temperature, unduly quick pulse, and a wrong relation between capillary reflux and blood pressure, and all who on any diet become progressively paler and weaker with subnormal temperature, *even though there is no loss of weight*, are underfeeding, and risking heart-failure, and a condition of debility from which it may be difficult to rescue them. They are also exposed to considerable danger of microbic invasion and therefore to boils or carbuncles, catarrh, influenza, tubercle or diphtheria, and have no reserve of strength and endurance for times of stress or strain should these unfortunately come upon them.

The Proceedings of the Roentgen Congress, held at Berlin, Germany, April 30 to May 3, 1905. (*Edited by Dr. Albers-Schoenberg, published by Lucas Grafe and Sillem of Berlin.*) This volume, which is printed in German and well gotten up, will be of much interest to roentgenologists, as it contains the full proceedings of the most remarkable and important convention which has yet dealt with this subject. As a whole it is a most valuable collection of Roentgen ray literature, and should form a part of any complete library. Although the bulk of the papers read treated, of course, of subject matter with which the radiologist is already familiar, some new ideas and facts were brought out, among them being the following:

1. *Roentgen Rays and Internal Medicine in Diseases of the Spine and Spinal Region.*

This paper was read by Dr. von Leyden of Berlin. He considers that the Roentgen rays are useful in diagnosing the causes of paraplegia and in determining traumatic lesions. The author demonstrated (1) negatives show ing tuberculosis of the eighth and ninth dorsal vertebræ which had been incorrectly diagnosed as syphilis from the clinical symptoms; (2) a negative showing metastasis from a sarcoma of the femur to the twelfth dorsal and the first and second lumbar; (3) fracture and displacement of the cervical vertebræ followed by recovery; (4) a case of symptoms of atrophic bulbar paralysis showing displacement of the cervical vertebræ which may have led to the bulbar paralysis; (5) a syphilitic with paraplegia, showing an osteo-porotic illumination of the vertebra which disappeared after treatment and recovery; (6) a bed-ridden syphilitic showing an osteo-porotic condition of the vertebræ of the upper half of the dorsal spine. A postmortem examination showed a thickening of the spinous processes and a degeneration of the lateral processes. (7) a case showing disease of the twelfth dorsal and the first three lumbar vertebræ as a result of myelomeningitis producing paraplegia; (8) a case of advanced tabes showed an osteo-porotic condition of the lower dorsal vertebræ. The urine of this patient showed a great excretion of calcium salts. (9) A case of tabes dorsalis showing an osteoporotic condition of the humerus, the jaw, and the lumbar vertebræ. The lumbar vertebræ also showed subluxation (osteo-arthropathia).

2. *On the X-ray Diagnosis of Calculi in the Urinary Tract.*

Dr. Reid of London, Eng., relates the chief features of his technique as follows:

The patient is given liquid food, and a saline aperient for two days preceding the examination, and the night before the examination a puragative. The patient is placed upon the abdomen upon a couch, and a cylindrical pillow six inches in diameter by two feet six inches in length placed underneath him between the ribs and the iliac crests. This serves a double purpose of compressing the abdomen and of making the back flat so as to lie in complete apposition with the plate. It is generally possible to see the renal calculus upon the screen, and the shadow is so seen to move up and down with each respiration from one to one and one-half inches. This fact, namely the wide excursion of the kidney during respiration, has not been sufficiently emphasized, and it is the omission to restrain the movements of the kidney that accounts for many of the inaccurate results that have at times been obtained. One negative is then made which takes in both kidneys, then a negative of each kidney separately. The negatives are repeated in all cases in two days.

The examination is made with the tube at a distance of twenty inches (anode), and during the time that the patient holds his breath, in deep inspiration. The author then describes an elaborate apparatus which enables him to make repeated exposures at the same phase of respiration upon the same plate.

3. *Concerning the Measurement of the Intensity of the Roentgen Rays.*

Prof. Walter of Hamburg, Germany, gave a critical review of the various measuring instruments, detailing their advantages and their disadvantages or points of inaccuracy. The instruments or methods so far in use are the "chromoradiometer" of Holzknecht, the "radiochromometer" of Gaiffe, and the method of Kohler, by which he builds a thermometer into the tube and estimates the quantity of Roengen rays by the degree of temperature change which takes place during a certain time. Finally Walter makes the suggestion that water-cooled tubes be used and the temperature of the water recorded. He concludes that all these methods are inaccurate, but that probably the best is a combination of the use of the Benoist-Walter Scale and the milliamperemeter, which when combined with the distance will produce fairly constant units.

ELECTROTHERAPIE CLINIQUE, by Dr. Laquerriere, Directeur de la Clinique Apostoli ; and Dr. Delherm, Ancien Interne des Hopitaux de Paris. With 65 figures and six plates outside of the text, 281 pages, and a preface by Prof D'Arsonval. Paris, A. Maloine, 25 Rue de l'Ecole de Medecine, 1906.

The book is written especially for general practitioners of medicine and does not aim to give all the details and theoretical considerations required by the special electrotherapeutist. The authors have the happy faculty of conveying in a few words a correct idea of the apparatus and technique they are describing. For example, the principle upon which a volt-controller or reducer of potential is constructed is readily understood from the fourteen lines occupied by its description.

The first chapter, on Electro-Physics, defines electricity as a modality of energy; (1) its use in therapeutics is based upon the facility with which energy in the form of electricity may be transformed into other forms and produce chemical, mechanical and thermal effects; (2) there are several different forms of electricity and these produce different physiological and therapeutic effects; (3) the same form of electricity produces different effects depending upon the dosage.

All the different forms of electricity, static, voltaic, faradic, high-frequency, X-ray and the rest are described, with a concise account of the apparatus for measuring and applying them. There is very little in regard to static electricity and the apparatus figured is the small machine, hardly more than a laboratory toy, which in European circles stands for this form of electricity. The reasons why electrodes of large size and heavy voltaic currents are required to produce deep effects is very well stated. At the surface in contact with the electrode the effect of the current is inversely proportional to the number of square centimetres surface of the electrode and directly proportional to the number of milliamperes of current, but in the deeper tissues the current is so widely diffused that the effect of a weak current would be practically *nil*. To obtain a deep effect in the abdomen for instance, a current of twenty-five or fifty milliamperes may be required and this should be applied by an electrode with a surface of one hundred square centimetres or more.

The idea of current density at the surface of the electrode is an important one. It should not be much over one milliampere per square centimetre. The deep effects to be obtained according to the authors are trophic, sedative upon the nerves, and regulative upon the circulation. The polar effects of the voltaic current are well described and also those of the various other currents.

The X-ray manipulations are supposed to be known by the reader but there is a brief description of Benoist's radiochromometer and Holzknecht's chromoradiometer. These are given as he standard means of measuring the quality and the quantity of the X-ray. Sabouraud and Noire's chromoradiomete is a modification of the Holzknecht and uses a wafer of barium platino-cyanide which when it has changed to a certain color indicates the absorption of the largest safe amount of X-ray.

Three methods of dosage are described: (1) *Oudin's*; short applications of thirty seconds, one minute, two, three minutes every two days, then stop for eight days and if there is no symptom of irritation apply for three, then four, and then five minutes. The appearance of an erythema serves as a guide to the duration and frequency of the applications and the length of the intermissions. (2) *Beclere's*; this author applies once in seven days the maximum quantity of X-rays compatible with the integrity of the skin. (3) *Belot's*; this author studies the case and decides from experience with other cases what amount of X-rays will be required to produce a cure or to provoke a certain degree of reaction. This amount is applied at a single seance or at two seances and the patient is sent away for fifteen or twenty days, at the end of which time the same dose is repeated.

Laquerriere and Delherm in the present book regard these methods as suitable for different cases, with a strong preference for the small frequent doses which when carefully applied need never produce a grave radiodermatitis. Generally speaking the fractional doses are desirable for superficial lesions and those in which the skin is unbroken, while massive doses are perhaps preferable when the integument is ulcerated.

The subject of electrodiagnosis is clearly presented. The authors recommend that reports should state the number of milliamperes and the polarity required to produce the slightest clearly visible contraction on the sound side and on the affected side. The plates showing the motor points of the muscles and the special points of the nerves are those of Professor Costex and are excellent. In the text description of these plates the various points are grouped according to the different nerves supplying them. Thus there is the territory of the facial nerve with the points where its trunk, its upper, middle and lower branch may be excited and the motor points of all the muscles supplied by it.

The reaction of degeneration is elucidated and the statement is made that when present it indicates a lesion either in the anterior cornua of the cord, or in the motor nerve or its terminal ramifications. It would not be found in a case of paralysis caused by a cerebral or bulbar lesion.

There are one hundred seventy or one hundred eighty pages devoted to the clinical application of electricity and this portion of the book could hardly be improved upon. The lesions of the different organs and regions of the body are taken up in a systematic manner and the exact form of current, its strength and duration, are described. Other details are given wherever necessary and a review of the cases already recorded and those of the authors themselves, as showing the probable prognosis.

The authors make a strong plea for the use of electricity for trigeminal neuralgia and even *tic douloureux*, the reason being that operative treatment presents a high rate of mortality and of recurrence, and besides is liable to leave paralysis of the facial nerve or some other bad effect. Two methods of application are available for trigeminal neuralgia. (1) *Bergonie's* (strong current); indifferent negative electrode four hundred to five hundred square centimetres over the back at the level of the upper dorsal vertebræ. The facial electrode, positive, has a surface of two hundred fifty square centimetres. The current is gradually turned on to twenty, forty, eighty or one hundred milliamperes for thirty minutes and then gradually turned off taking two or three minutes to reduce it to zero. Treatments at first every day, later three times a week. (2) *Zimmern's* (weak current, long application); the same electrodes as above, three to fifteen milliamperes for forty-five minutes or an hour. (3) *The authors'* plan is to use the heavy currents on patients to whom they are not disagreeable and the lighter currents in the case of sensitive patients. There is a very good percentage of cures and most cases are so much relieved as to save them from the necessity of an operation. The latter should not be resorted to until electricity has been thoroughly tried.

The treatment of chronic constipation is based upon the supposition that it is a spasmodic condition requiring not a treatment which will provoke muscular contraction but one which will relax muscular spasm, and this the authors find in the continuous voltaic current, gradually increased to one hundred milliamperes and lasting for ten or fifteen minutes, and applied three times a week at first but later at longer intervals.

The above citations go to show that the therapeutic uses of electricity as recommended in the book are such as may be safely taken as a guide. Altogether the book covers its chosen territory admirably and affords a valuable *résumé* of present methods and results in electrotherapy.

APPARATUS

Roentgen Tubes. It is now nearly 11 years since the first X-ray or Roentgen tube was made in America, and many changes in construction have been adopted and new types devised, all more or less successful. This fact has been strongly and in some instances painfully impressed upon most of the earlier users. Until the last six months, however, it was almost impossible to purchase a tube in this market which would come up to the expectations of the purchaser because all tubes, domestic or imported, had, owing to the nature of the ray itself being so little known, to be what is termed " cured," or, in other words, they were all soft tubes and had to be made hard by long use, before a good radiograph of the heavy parts of the body could be made with them. As a matter

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of fact, this is true of nearly all tubes today (we say *nearly* all advisedly). All the imported tubes, while they will eventually do fine work, have to be worked up to that capacity by the operator himself.

Dr. Lewis Gregory Cole, in a recent very able article on X-ray tubes, proved beyond the shadow of a doubt that the trouble with all tubes is the presence of three kinds of rays: the direct, the secondary, and the indirect rays. The *direct* are the ones which by passing through the glass walls of the tube cast a shadow of the bones on the photographic plate, while the secondary, or *indirect* rays, leaving the tubes at a tangent and forming other rays, pass around the bones and partially or wholly destroy the image which is the work of the direct rays, and there is nothing of any value on the plate. This, we believe, is true of all new tubes heretofore made, but as the tube is used and the gas is destroyed, the wall of the tube opposite the focus undergoes a chemical or structural change, allowing all, or nearly all, of the direct rays to pass through unimpeded. There are then practically no secondary rays, or stray rays, generated. Consequently the time of exposure is shortened and the radiograph becomes nearly perfect.

But this is a long and expensive process, and full of disappointments to the operator until the tube is cured; and about that time, just when you would refuse several times its original value for it, something happens: it either punctures or cracks mysteriously. And why should it not? The reason is plain. It was so exhausted in the beginning that the doctor had to work it to death before it had learned its trade.

A tube, improperly made, is purchased by an operator who is told that it is the best procurable. He connects it with his coil, runs a current of ten amperes through it, and in ten seconds (it has no penetration to begin with) it is full of blue gas and giving no visible rays. Sometime just before it is worked out it does marvelously well. You all know the symptoms. Would it not be better to get a tube which will run on 30 to 40 amperes for 10 to 20 seconds, when new, before any blue gas shows, and which will recuperate as soon as it is cold again, running longer and longer after each successive use, having little or no secondary or indirect radiance in the beginning, and capable of the same rate of improvement as the ordinary tube?

But we hear you say, "Is there such a tube made?" The writers have made the X-ray tubes their exclusive study for the past 11 years, and, after repeated failures, have evolved a process whereby the effect of an old tube, so far as its ability to make radiographs is concerned, is obtained without in the least effecting its life, and incidentally, this process eliminates to a great extent the stray rays. The tube has been on the market for the past six months, but we have refrained from writing an article on it until we had it thoroughly tested by disinterested experts, who have pronounced it a success.

In conclusion, the tube of the future is assured, devoid of all the objectionable features of the past. We will be glad to correspond with all, especially the first operators. There is no reason why, with the proper amount of encouragement from the users of tubes, the present improvement may not be carried further.

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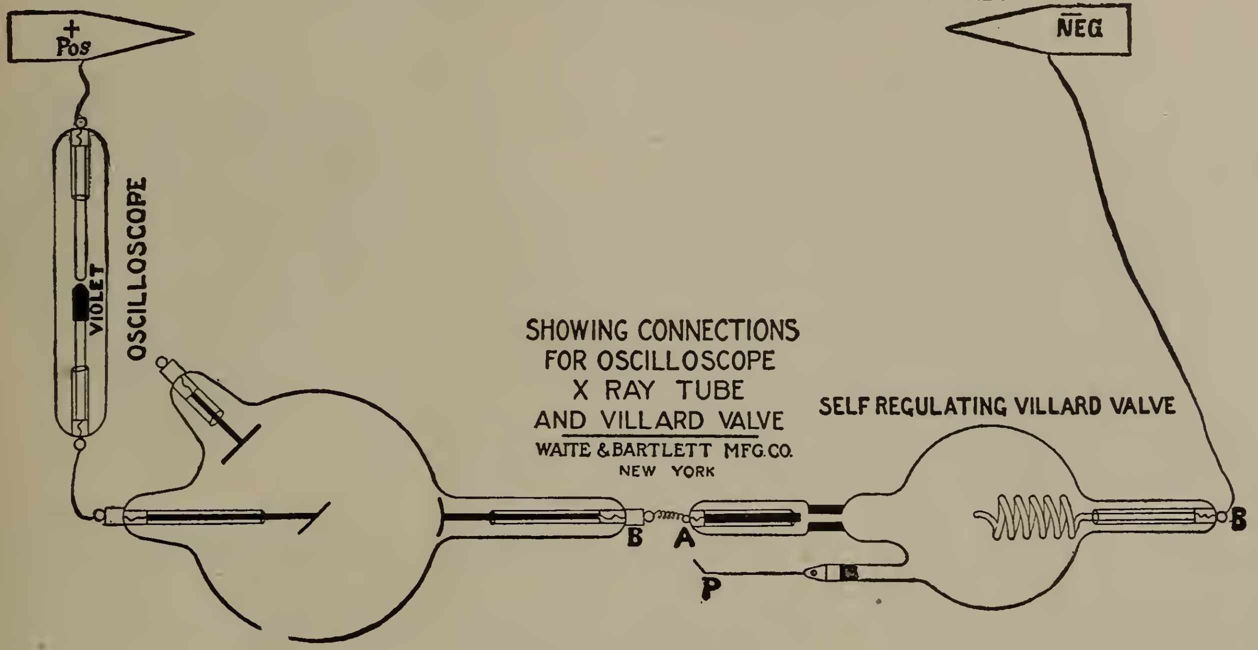

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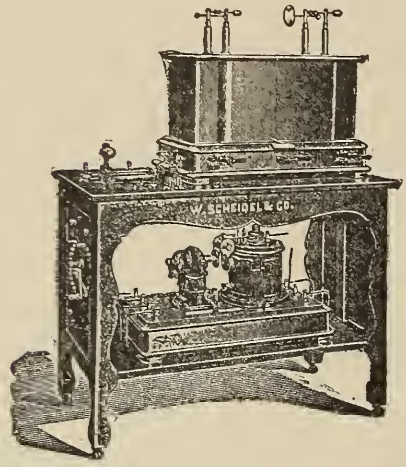

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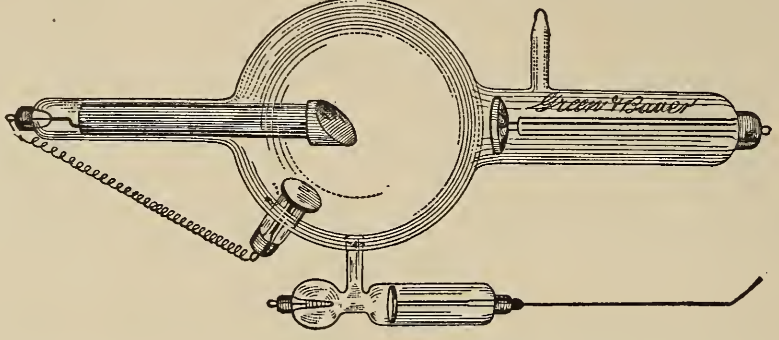

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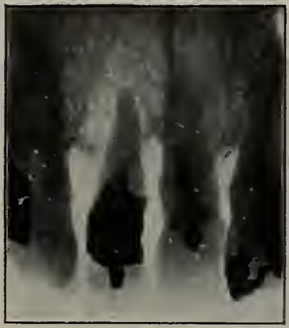
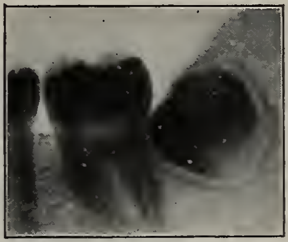
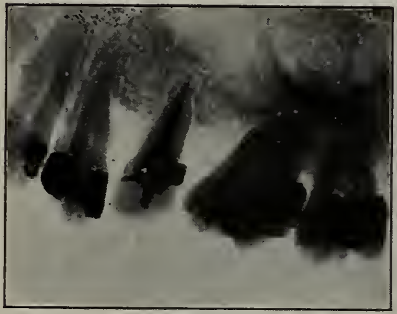


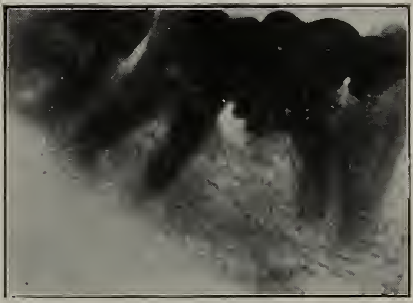
Root Abscess



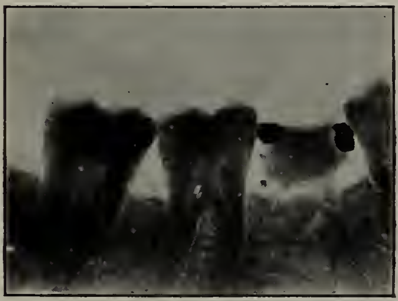
Third Molar as it appears
at the age of thirteen years



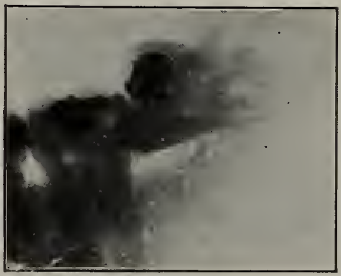
Outline of Antrum



Resorption of Posterior Root



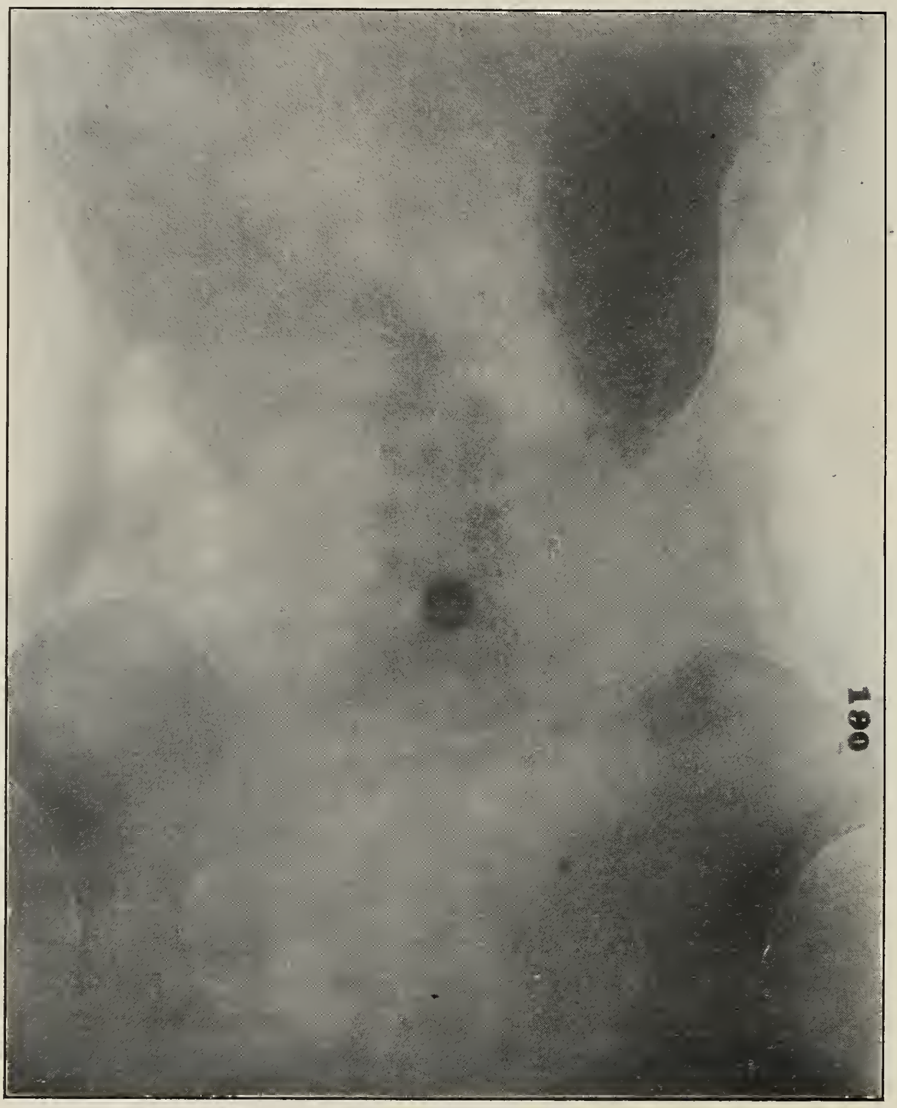
Absence of Second Bicuspid



Impacted Third Molar

Special Plate LXV

BY DR. LEVITT E. CUSTER, DAYTON, OHIO



Special Plate LXVI

GASTROPTOSIS

The patient was examined in the prone position just after having taken an ounce of bismuth and a pint of milk. The stomach is shown nearly in a normal vertical position, the food just passing through the pylorus. A second roentgenograph made immediately after with the patient in the standing position showed the stomach entirely below the umbilical line.

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THE CLIMATOLOGY AND HEALTH RESORTS OF SOUTH CAROLINA

BY JAMES K. CROOK, M. D., OF NEW YORK CITY

THE State of South Carolina lies within the parallels of 32 deg. 4 min. 30 sec. N. latitude and the meridians of 78 deg. 25 min. and 83 deg. 49 min. W. longitude. It is roughly triangular in shape, measuring 189 miles in length and 160 miles at its greatest breadth. The gross area of the State is 30,570 square miles, 400 of which are water surface. By the last federal census, 1900, South Carolina contained a population of 1,334,788, giving the State a density of 44.4 inhabitants to the square mile, which is by no means crowded. (Rhode Island has 407 and Massachusetts 348.9 to the square mile.) At the rate of increase observed during the preceding decade, 15.6 per cent., the population at the present date is close to 1,500,000.

Topographically, the State may be divided about equally into three fairly distinct sections: first, the lowland district, beginning at the sea coast and extending about a hundred miles inland. The surface here is very flat and in places swampy, and well adapted for the cultivation of rice. Much of the surface of this district is sandy and covered by pine forests.

The ground gradually rises as the interior is traversed until the rolling and diversified second section is reached. This district is noted for its long-leafed pines and its sand hills, and has an average elevation of two hundred and fifty feet above the sea level.

The surface becomes more broken as we proceed to the North and West, until the third or mountainous section is gained. This part of the State presents some very charming scenery and is visited by tourists from far and near. Rich Mountain has an elevation of 3,569 feet and is the highest point in the State. Other well-known mountain summits are Mount Pinnacle, 3,436 feet; Table Rock, 3,124 feet, and Cæsar's Head 3,225 feet in height.

The State has a water front on the Atlantic of about two hundred miles. The coast is fringed by many islands, inside of which are numerous sounds which afford a safe and tranquil haven and passageway for vessels of light draught. The ocean front is indented by a number of bays and inlets, one of them, Port Royal, forming one of the finest harbors on the globe. The harbor of Charleston is also of the first class.

South Carolina is exceedingly well irrigated and drained by numerous water courses, the largest river being the Santee, formed by the Saluda, Congaree, Catawba and Wateree, uniting in the middle of the State. The Great Pedee in the East and the Savannah on the Georgia border, are also large and important water-courses. The streams of the State pursue a general southeasterly course and of those rising in the mountains nearly all are navigable almost to the foot-slopes. Here numerous rapids and falls lend their charms to the scenery and at many points supply power for mills and factories.

The flora of South Carolina is exceedingly rich and varied, embracing most of the varieties indigenous to the temperate zone, besides numerous subtropical plants and shrubs. Cotton and rice attain a high degree of excellence, the famous sea-island cotton of the coast district being perhaps the finest in the world. Almost all the well-known varieties of fruits, cereals and garden truck thrive in the State. South Carolina is rich in magnificent timber trees. The long-leafed or yellow pine, confined chiefly to the low country, still covers several millions of acres and furnishes vast quantities of pitch, tar, turpentine and rosin. Oaks of several varieties are also abundant. A morning ramble in a typical South Carolina rural retreat is not soon forgotten. The dog-wood and fringe tree adorn the great woods and the murmuring of the gentle Southern breeze through the lofty pines furnishes a soothing lullaby to the ear accustomed to the clang and bustle of a great city, while the balsamic piney aroma mingles with the sweet perfume of the Cherokee rose, the yellow jasmine, and the honeysuckle, forming an alluring blend which the rambler is loth to leave. The garden flowers in the cities, especially in Charleston, Columbia and Beaufort, are the admiration of Northern visitors. The palmetto palm which gives its name to the State, is peculiar to the coast region.

The forests of South Carolina still abound in small game, while the low rice region along the coast furnishes a home for many varieties of feathered folk. Almost every known species of food fish is found in the many streams and in the bays and inlets.

The climate of this State may be described as partly continental and partly marine, according to the location and the direction of the wind. In general it is mild and genial. The winters are short and never severe, the summers are long and warm, but not depressing. Snow falls every winter in the mountains, but does not remain long. In the middle district visitations of snow and ice are experienced in what are termed "hard winters," but they cut little figure in the business or pleasures of the residents, while on the coast freezes and snows are rarely seen.

In addition to its picturesque scenery the mountain district, as shown by morbidity and mortality statistics, is exceedingly salubrious. The central section is blessed with mild and uniform winters and contains several widely celebrated resorts.

The barrens of the long-leafed pine section as well as the sea-islands are regarded as being very healthful and furnish the planters of the low and swampy districts with a convenient summer refuge. These latter as well as some of the river bottoms are not safe for unacclimated persons during the hot weather. The malaria-bearing mosquito is found in great force in these localities and as a consequence chills and fever form a common scourge.

The mean annual temperature varies from 60 deg. F. in the northern to 67 deg. F. in the southern part of the State. The mean annual rainfall is between forty and forty-eight inches, forty-five inches being a fair average for the State. The winter visitor to South Carolina must not expect to find entire perfection in the climate. Such climates do not exist and that of the little Palmetto State has its undesirable features also. Perhaps the phase of winter weather most cavilled at is the occasional tendency to prolonged cloudy and rainy spells. These are sometimes very irritating to the winter sojourner, but a study of the climatic tables in several of the resorts, an account of which follows, will show that the percentage of sunny days is very high.

The Carolina littoral is liable to feel the force of violent storms brought in from the ocean, which sometimes take the form of cyclones or even hurricanes. These generally make their appearance about the autumnal equinox. The great earthquake of 1886 has fortunately not been repeated. The generally salubrious conditions of the State are shown in the small death rate presented by the census returns: 13.46 per one thousand inhabitants. The mortality rate from consumption is 1.83 per thousand of population.

CHARLESTON

This is the chief city and commercial emporium of South Carolina. Its population in 1900 was 55,807. The city is located on a flat tongue of land pointing southeastward between the Ashley and Cooper Rivers which debouch into a spacious harbor extending about seven miles southeast to the Atlantic, and having an average width of two miles. Owing to the low level of the ground on which it lies, the city presents an appearance of great picturesqueness on being approached from the ocean side, the church spires and tall buildings appearing to rise out of the sea. The beauty of the picture is enhanced by the richness of the surrounding foliage, while glimpses of historic old Fort Moultrie and Fort Sumter add a touch of patriotic interest to the scene.

The streets of Charleston are regularly laid out; many of them are lined with ornamental shade trees, live oaks predominating, and are generally well paved and lighted with gas and electricity. There is some dearth of public squares and parks, but this want is partially supplied by the beautiful and spacious gardens that surround the old-fashioned southern homes. It is altogether a quaint and picturesque old city, having an atmosphere distinctly southern, the imprint of the Huguenot founders delightfully blended with that of the Anglo-Saxon settlers. The palmettos wave green fans from streets and gardens at the passers-by; magnolias, jessamins, camelias and azaleas peep over the walls, and the whole place is redolent of that period when "romance and chivalry had time to tread a measure, so out of place with the rush and strife of the work-a-day twentieth century." Many old churches of the Revolutionary period are still in use. Legare street and the Battery, a handsome esplanade five hundred yards long and enclosing on the ocean side an attractive park, are the most aristocratic residential quarters.

The city has several well-known educational institutions, among them being the Medical College of the State of South Carolina, and the State Military Academy. The Charleston library was founded in 1748. The city now has a number of excellent hotels, where the sojourner may feel sure of a full mead of comfort and good cheer. The new and elaborate St. John's Hotel, opened 1902, allows its guests the privileges of the Charleston Country Club with its excellent golf course. The recently opened Villa Margarita and Shamrock Terrace, under the same management, are smaller establishments, where the guest of quiet, but refined, tastes will find a congenial atmosphere.

Just across the harbor on the Isle of Pines is a superb bathing beach stretching along the ocean front as smooth and hard as a boulevard for a distance of nine miles. Other attractive points near the city are the Chicora Park and the Gardens of Magnolia on the Ashley River.

Three great artesian wells, yielding two millions of gallons daily, are the chief source of the city's water supply. Several artesian borings in the city have been found to supply waters quite densely impregnated with mineral ingredients. One of these, known as the "Old Artesian Well," is 1,250 feet deep and its water contains 135 grains of solid contents per U. S. gallon. This is composed chiefly of sodium bicarbonate and sodium chloride. It has a distinct title to the designation "mineral water" and has been employed therapeutically for many years.

The climate of Charleston is mild and equable. The mean January temperature, 48.5 deg. F., is almost identical with that of Rome, Italy, 47.3 deg. The city is a popular resting place for health-seekers and tourists on the way to and from the resorts further south. Many elect to remain there during the cold months.

The city is said to have an excellent Board of Health and the most improved sanitary regulations are in vogue. Under these exceedingly favorable environments it is surprising to find the mortality rate so high. According to the U. S. census returns the death rate for Charleston in 1900 was 37.5 per thousand of population, or higher than that of any other city of the Union except Shreveport, La., 45.5, and Natchez, Miss., 39.7 per thousand of inhabitants. Charleston also stands high in mortality statistics for phthisis, the death rate from that disease, 4.64, being higher than for any other city except the two above mentioned. The fact that a high phthisical mortality rate prevails at Los Angeles, California; San Antonio, Texas, and Jacksonville, Florida, all important resorts or distributing points for tuberculous patients, is well known, and it is not to be doubted that visiting invalids contribute in no small degree to the large death list.

The writer is informed, however, by Dr. Robert Wilson, Jr., of Charleston, that the excessive tuberculosis mortality lists of that city receive very few accessions from the transient invalid residents. The explanation, says Dr. Wilson, is found in the large negro population (negroes 31,522, white 24,238 in 1900). The great prevalence of consumption among the negroes is not the expression of a peculiar racial susceptibility, but is due to ignorance, poverty and carelessness, close crowding in badly ventilated quarters, insufficient food, clothing and warmth. According to Dr. Wilson's calculations pulmonary tuberculosis is perceptibly decreasing in Charleston. In 1899 the mortality from that disease was 4.73 per thousand of population; in 1900 it was 4.19 (a little less than the figure of the Census Bureau), while in 1904, the rate had dropped to 3.64. We are fortunate in possessing a climatic summary of Charleston covering a period so long as that shown by the following table:

CHARLESTON, SOUTH CAROLINA
Lat. 32° 47′ N. Long. 79° 56′ W.
Period of Observation, 12 years, 10 months

Climatic Data	Jan.	March	July	Nov.	Year
TEMPERATURE, FAHRENHEIT					
Average or Normal	49.5	57.8	82.8	57.2	65.9
Average Daily Range	14.6	15.0	14.1	14.1	
Mean of Warmest	58.4	67.1	90.2	65.0	
Mean of Coldest	43.8	52.1	76.1	50.9	
Highest or Maximum	80.0	85.0	104.0	82.0	
Lowest or Minimum	23.0	28.0	67.0	28.0	
HUMIDITY					
Aver. Relative, per cent	75.4	69.6	74.3	71.7	73.8
PRECIPITATION					
Average in inches	3.77	4.47	7.18	3.51	59.9
WIND					
Prevailing Direction	N.	S. W.	S. W.	N. E.	S. W.
Average hour velocity (in miles)	7.3	8.8	7.7	7.5	7.9
WEATHER					
Av. number clear days	9.5	12.7	10.4	11.5	134
Av. number fair days	10.5	10.8	14.6	10.5	140.3
Av. number of clear and fair days	20.0	23.5	25.0	22.0	274.3

For a period covering ninety-four years, between 1738 and 1901, the average annual precipitation at Charleston has been found to be 48.72 inches.

A table compiled by the writer from the Annual Reports of the U. S. Weather Bureau for the years 1901, 1902 and 1903, agrees closely with the above. The following comparative table of New York City and Charleston is of interest:

	January		March		July		November		Year	
Average Number	Charl.	N. Y.	Charl.	N. Y.	Charl.	N. Y.	Charl.	N. Y.	Charl.	N.Y.
Clear Days	9.5	7.6	12.7	7.9	10.4	7.5	11.5	8.4	134.0	98.6
Fair Days	10.5	11.6	10.8	13.5	14.6	15.5	10.5	11.5	140.3	183.4
Clear and Fair Days	20.0	19.2	23.5	21.0	25.0	23.0	22.0	19.9	274.3	252.0

It will thus be seen that Charleston has annually about 22 more clear and fair days than has New York. The average annual relative humidity is slightly greater at Charleston, while the wind movement is greater in the northern city. Clinical experience bears out the data supplied by a study of the climate, viz.: that certain classes of invalids are much better off in Charleston during the three or four cold months of winter and early spring, than in the cities of the northern seaboard. Among those particularly benefited are cases of early phthisis, recurring bronchitis, bronchial asthma, pulmonary emphysema, and persons of delicate physique, poor blood and irritable nervous systems.

CAMDEN, KERSHAW COUNTY

This quaint old Revolutionary town is located in the long-leafed pine district of South Carolina, thirty miles northeast of Columbia and twenty hours by the Seaboard Air Line Railway from New York. As the crow flies, the location is seventy miles from the Atlantic. The U. S. Census of 1900 credited the town with 2,800 inhabitants, but counting in the suburbs, this number is now (1906) almost doubled. The transient population is also very considerable during the winter months.

The elevation of Camden varies from one hundred and fifty to two hundred feet above the sea level. The soil is sandy and exceedingly porous and absorptive, so that the effects of even severe and prolonged rains quickly disappear. The streets of Camden are broad and shaded by oaks, elms and pines. There are good schools, stores, banks, churches and an opera house.

The residents are justly proud of the historic associations of Camden. Here is located Hobkirk's Hill, where Greene and Rawdon fought away back in 1781. In the old Presbyterian churchyard lie the remains of gallant Baron De Kalb, who was killed in the battle fought close by. The cornerstone of his monument was laid by Lafayette. The earthworks thrown up by Cornwallis are still pointed out to the visitor. There are several very comfortable hotels in Camden, the best known being Hobkirk Inn, the Court Inn, and the Hotel Kirkwood.

The drives about the place are very fine, giving the visitor views of the Wateree River, and running through the pine forests over smooth, sweet-smelling carpets of pine needles, in some places bordered with Cherokee roses, in others with handsome gardens filled with jasmine and magnolia, and ever and anon a fine old colonial mansion. A pretty lake, stocked with trout, bream and pike is a feature of the town not to be overlooked. Camden is a very charming place socially, and there is no lack of amusement for the pleasure-seeker. The shooting in this section is excellent and the place is widely celebrated for its fox-hunts. Golf, polo and tennis are also important social features.

Climatically, this region is very similar to that of Pinehurst and Southern Pines, some thirty odd miles northeast of Camden. We find here the same dry and sandy soil, the same preponderance of long-leafed pines, and very similar atmospheric conditions. It is stated that the permanent residents of Camden are practically immune from pulmonary and throat troubles, while malaria is unknown among the natives. The mean winter temperature is 45.16 deg. F., spring 61.90 deg. F., summer 79.32 deg. F., and autumn 62.26 deg. F. The mean annual rainfall for a period of twenty years was 42.22 inches. In February and March there are some high winds, but generally the air is remarkably soft, dry and balmy. The prevailing winds are southwesterly or southerly. The average relative humidity at Camden is not positively known, but it is believed to be about the same as at Columbia (q. v.). The mean temperature on the north porch of the Court Inn at Camden was for December, 1903, 41.11 deg.; for January, 1904, 40.56 deg.; February, 1904, 43.86 deg., and for March, 1904, 58.80 deg., this being a normal winter.

Camden may be confidently recommended as a winter home for the aged, the feeble, the neurasthenic, or the valetudinarian in general, who seek to escape the rigors of winter in higher latitudes. The genial climate admits of much time being spent out of doors. The weather is well adapted for cases of early phthisis. Persons suffering from bronchial asthma and chronic bronchitis also experience much relief during the winter months. The resort has sufficient attractions to engage the serious attention of the ordinary seeker after recreation or pleasure.

COLUMBIA

The capital of South Carolina, is one of the prettiest cities in the South. It is not, strictly speaking, a health resort but many seekers after improved climatic conditions stop there temporarily, and not a few northern visitors choose to remain during the entire period of their stay in the South. The city is located in Richland County on the east bank of the Congaree just below its junction with the Saluda and Broad and very close to the geographical centre of the State. It is reached by the Seaboard Air Line in twenty-one hours from New York. The population in 1900 was 21,108, but as the city is growing rapidly, this number is now greatly increased. It was occupied by the Union Army under General Sherman in February, 1865, and a large part of the place was burned at that time.

Columbia has been the home of many distinguished men, and, as the political centre of the State, has held a position second in importance only to that of Charleston. It has long been noted for the natural beauty of its site and surroundings. The Congaree at this point is two hundred and thirty-three feet above the sea level, and the plateau upon which the city is built is more than a hundred feet higher than the river, commanding a superb view of the surrounding country. The city is regularly laid out with broad streets, macadamized roadways, and paved sidewalks. The thoroughfares are handsomely shaded and several of them are a hundred feet in width. Columbia is the site of the South Carolina Agricultural and Mechanical College, the Presbyterian Theological Seminary, the Ursuline Convent, several academies for the education of both sexes and excellent public schools. There is a library of thirty thousand volumes. The new capitol, a granite building costing three millions of dollars, is one of the finest in the United States. There are two large and well appointed hotels and numerous boarding houses. There are a number of attractive points in and near the city well worth visiting.

The soil of Columbia is sandy and permeable, and the climatic conditions in general are similar to those of the pine-barren district. The long-leafed pines crowning the hills lend a pleasing fragrance to the air which is popularly believed to contribute to its salubrity. The city is perfectly drained by reason of its position with reference to the river. The adjoining table shows the temperature range and rainfall as set forth in the three latest annual reports of the U. S. Weather Bureau.

COLUMBIA, SOUTH CAROLINA

Lat. 34° N. Long. 81° 03′ W.

Climatic Data for a Period of Three Years.

	Temperature				Rainfall			
	1901	1902	1903	Mean for 3 yrs.	1901	1902	1903	Mean for 3 yrs.
	Degrees F.				ins.	ins.	ins.	ins.
January	45.8	43.1	44.0	43.3	3.34	1.85	3.06	2.75
February	43.0	41.0	50.0	44.6	5.11	5.12	7.30	5.84
March	54.0	54.6	61.1	56.5	4.50	4.16	3.90	4.18
April	56.2	61.0	60.8	59.3	4.04	3.23	3.11	3.46
May	72.0	74.2	71.0	72.4	8.52	3.33	2.39	4.74
June	78.0	78.4	74.2	76.8	4.94	4.43	9.97	6.44
July	81.8	82.3	80.8	81.6	2.58	2.78	2.94	2.76
August	79.1	78.5	80.5	79.3	7.76	7.14	9.47	8.12
September	73.6	72.4	72.8	72.9	6.13	2.86	2.68	3.89
October	63.1	65.1	63.6	63.9	0.47	4.39	1.94	2.26
November	49.0	59.6	51.6	53.4	0.95	3.31	1.36	1.87
December	44.6	47.3	42.4	44.7	4.88	3.60	1.70	3.39
Mean temp. 12 mo.	61.7	63.1	62.7	62.5				
Highest temp. 12 mo.	100.0	101.0	98.0					
Lowest temp. 12 mo.	16.0	18.0	19.0					
Total rainfall 12 mo.					51.22	46.20	49.52	
Average rainfall, 3 yrs.								49.08

The average relative humidity at Columbia for December, 1902, was 81 per cent. at 8 a. m. and 61 per cent. at 8 p. m.; for January, 1903, 83 per cent. at 8 a. m. and 68 per cent. at 8 p. m.; February, 1903, 77 per cent. at 8 a. m. and 64 per cent. at 8 p. m. For the year 1903 the figures were 81 per cent. at 8 a. m. and 68 per cent. at 8 p. m.

These figures may be taken as fairly representative of the chief weather conditions of central South Carolina.

As compared with New York city, the winter temperature of Columbia may be shown as follows:

	December	January	February
Columbia	44.7° F.	43.3° F.	44.6° F
New York	32.2	30 4	29.5

This shows a winter average of 43.-20 F. for Columbia and 30.7 for New York. For the month of December, 1902, and January and February, 1903, Columbia had nine days, or ten per cent. more of fair weather, than New York City. It is probable that the record for a series of years would show an even greater difference.

The prevailing winds in Columbia are southwesterly. The net result of its advantages of situation and climate has been to make this little city a place of great healthfulness and one of the best winter health resorts of the South

AIKEN

The county seat of Aiken County is located in the southwestern part of South Carolina, one hundred and twenty miles northwest of Charleston and eighteen miles east of Augusta, Georgia. It is reached from New York by the Pennsylvania and Southern railways in about twenty-two hours.

The town contains about four thousand inhabitants. It is situated on a plateau about six hundred feet above the level of the Atlantic ocean, from which it is distant one hundred and five miles in a bee-line. The soil is composed almost entirely of pure unmixed sand. The characteristic long-leafed yellow pine predominates in the forests with an admixture of several varieties of oak. The grass is scanty and the vegetable growth such as is generally found in a dry, porous soil. There are, however, many varieties of flowering vines and shrubs.

The favorable location and dry, salubrious atmosphere have served to bring Aiken into great prominence as a winter climatic station. Many elegant homes have been established, club houses have been erected, and several good hotels and numerous smaller houses are at hand to cater to the wants of the increasing number of visitors. The largest hotel, the "Park in the Pines," recently opened, has three hundred rooms and an excellent *cuisine,* and is regarded as one of the best winter hotels in the South. Several of the smaller hostelries are also thoroughly comfortable and provided with modern conveniences.

A special feature of Aiken is the home life. Cottages of all sizes may be had from the simple three-room shack to the pretentious villa provided with twentieth century improvements. The Aiken Cottage Sanitarium under charge of Dr. C. F. McGahan has been in operation since 1896. It is modeled after the institution of Dr. Trudeau at Saranac Lake, New York. The chief measures of treatment consist of good nourishment and keeping the patients in the open air as much as possible.

Dr. Otis of Boston, who has written very comprehensively of Aiken and its advantages, and to whom the author is indebted for much valuable climatic data, remarks that we possess in this climate all of the attributes of a health resort favorable for the relief of pulmonary tuberculosis except altitude and its accompaniments, viz. pure dry air at a moderate temperature, a dry and well-drained soil, an absence of high winds, with an occasional exception, and an abundance of sunshine . . . "but it must nevertheless be borne in mind that not all cases of pulmonary tuberculosis are suitable for the high altitudes. Here we can carry out to perfection the modern open air treatment, which after all, is the essential part of the climate treatment of tuberculosis." *

Patients suffering from chronic albuminuria and rheumatism also do well at Aiken during the winter months. Neurasthenia and insomnia in many cases yield to the quiet and restful surroundings and balmy atmosphere. Delayed convalescence from many forms of acute disease is benefited, and the climate is suitable for the large class of physically deteriorated from general debility or other causes. At Aiken they can live in comfort with little expenditure of vital force.

The following table of temperatures, presented by Dr. Otis, is based upon observations taken at 7 a.m., 2 p.m. and 9 p.m. by Messrs. H. W. Ravenel, J. H. Cornish and Newton, extending over a period of seventeen years from January, 1853, to December, 1869:

January	44.15	July	78.80	Spring	61.32
February	47.83	August	77.19	Summer	77.36
March	53.22	September	72.23	Autumn	61.96
April	61.49	October	61.80	Winter	45.82
May	69.25	November	51.84	Year	61.61
June	76.08	December	45.58		

The following table by Dr. Charles F. McGahan shows the climatic conditions prevailing at Aiken during what might be termed the resort season, from November 1st to May 1st. The observations were made with U. S. Signal Service instruments and under Signal Service Regulations.

AIKEN, SOUTH CAROLINA
Lat. 33° 32′ N. Long. 81° 34′ W. Altitude 565 feet.
Period of Observation 1888 to 1894.

	Mean monthly temperature at hour of			Mean monthly temper. from total observations.	Mean Barometer	Prevailing wind direction.	Mean relative humidity.	Aver. number of clear days.	Aver. number of rainy and cloudy days	Mean monthly rainfall in inches.
	7 a.m.	2 p.m.	9 p.m.							
November	48.33	61.47	52.69	53.54	29.62	S. W.	59.65	27	3	1.33
December	42.48	57.05	48.02	48.49	29.54	W. and S.W.	58.58	26	5	2.65
January	41.28	52.67	44.54	45.75	29.61	N. E.	63.17	23	8	4.68
February	44.41	56.84	49.92	50.27	29.62	S. W.	60.31	24	4	4.35
March	49.55	59.80	53.36	54.02	29.49	S. W.	57.90	26	5	6.07
April	57.23	71.78	53.26	58.88	29.54	S. W.	52.78	29	2	2.33
Average				51.89	29.57	S. W.	58.73			

The diurnal variation of temperature as shown by Dr. McGahan is as follows.—

Month	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Daily Variations	13.14	14.57	10.39	12.43	10.25	18.52

The figures thus set forth indicate a very desirable combination of climatic factors. The mean relative humidity is very low, the average rainfall light for the winter season and the number of clear days unusually large. Extremes of temperature are wanting and the daily variations very moderate.

A comparison of the chief January climatic figures of Boston, Mass., with those of Aiken for the month of January is of interest.

22 years' record	AIKEN	BOSTON
Average relative humidity	63.17%	71.8%
Average temperature	45.75	27.0
Clear and fair days	23.00	16.6
Rainy and cloudy days	8.00	24.6
Rainfall in inches	4.68	3.81

The chief advantages for Aiken shown in this table are the milder temperature and the larger number of clear and fair days. The actual precipitation at Aiken for January is slightly greater

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*Quoted from the Smithsonian Contributions to Knowledge, No. 277.

than at Boston, but at the former place the rain falls in torrential showers and is soon over and quickly absorbed by the porous earth, whereas, in Boston the winter rainstorms are liable to be prolonged over several days. It rains at Boston an average of 12.2 days in January. It may be again pointed out in this place that the average number of rainy and cloudy days at Aiken is five for December, four for February and five for March. It is well known that the wind movement at Boston is far in excess of that at Aiken during the winter.

The water supply of the town is derived from an artesian well 780 feet deep, the last 200 of which was driven through a solid bed of granite. An analysis in 1898 by Prof. Chandler of New York is said to have shown absolute purity.

The drainage system of Aiken is one that has been tested for a number of years by the State Board of Health of Massachusetts for its inland towns and is considered by sanitary engineers the best yet devised for such places. We are informed that the malarial mosquito has no residence in Aiken or its environs. The late Dr. Geddings after a local practice of fifteen years stated that he had never known a case of malaria to originate at Aiken.

There are churches of all the leading denominations in the place and the school advantages are excellent.

A wide range of amusements is at the choice of those seeking such diversions. Horseback riding, driving, fox hunts and polo are much indulged in. The Palmetto Golf Club has convenient links and there is a fine smooth bicycle track through the pine woods.

SUMMERVILLE, DORCHESTER COUNTY

This is an old time resort which has recently come into wide prominence. The location is twenty-two miles, about thirty minutes by rail, northwest of Charleston and about seventy feet above the sea level. The census of 1900 gives Sumnerville a population of 2,800, but this number is greatly increased by the winter colony.

This resort lies in a parallel only about half a degree south of Aiken, but being some eighty miles nearer the ocean, it presents certain climatic differences. We find here the same balsamic yellow pines, the absorptive sandy soil, the mild winter temperature with small diurnal variations, and a large percentage of sunshine; but the average relative humidity is greater at Sumnerville, the average rainfall is larger, and there are a few more cloudy days during the season than at Aiken. Its proximity to the sea is also liable to bring upon it a taste of the violent atmospheric disturbances which are liable to visit the Carolina littoral during the winter. However, we are informed by Dr. Prioleau of Sumnerville that the atmospheric changes are seldom so sudden as to cause any serious anxiety or discomfort.* Frost occurs from April to November, and in the depth of winter thin ice is formed and snow falls at long intervals.

The natural drainage is excellent, but this is supplemented by the construction of an open canal, some miles in length, on one side of the town which receives the drainage of acessory canals and ditches. The sanitary regulations of the place are under the charge of a very efficient and alert local Health Board.

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* Otis, Ref. Hand-Book Med. Sci. Vol. VI, 1904.

The water supply is obtained from open wells supplemented by several artesian borings. One of the latter on the Pinehurst Farm is nine hundred and sixty feet in depth. Its water is strongly mineralized, containing 94.37 grs. of solid contents per U. S. gallon. The principal ingredients are the carbonate and bicarbonate of soda. The author would classify this water as an alkaline-chalybeate, as the analysis shows sufficient iron to give it decided ferruginous properties if habitually consumed.

Summerville is well prepared to cater to the comfort of its visitors, having in the Pine-Forest Inn a modern, high-class hostelry occupying a magnificently wooded plateau of about sixty acres. The trees are mostly pines and live-oaks. In connection with the hotel is a number of comfortable cottages. Dorchester Inn is also provided with all needed modern conveniences and is a popular winter stopping place. There are also plenty of boarding houses to accommodate all who apply.

The amusements of Summerville consist chiefly of riding and driving, golfing, trap shooting, rambling through the pines, and visits to historic landmarks, ancient churches, plantations, etc. The old Ingleside Farm of eighteen hundred acres is reserved as a hunting preserve and is well stocked with deer, quail and other game. At Ingleside stands the old Colonial Oak under which tradition has it that General Marion invited the British officers to partake of his dinner of sweet potatoes. Another point of great interest at Summerville is the Pinehurst Garden Park with its great variety of ornamental trees and shrubs. Here are located the famous Tea Gardens said to furnish the only example of successful tea culture in the United States.

The early spring at Summerville is certainly "enchanting with its soft intoxicating atmosphere, its gardens of azaleas and roses, and its wealth of field flowers, long-legged violets and other wild blossoms that carpet the earth, miles of honeysuckles, dogwood and magnolia, and the Cherokee rose and yellow jasmine festooning tree and bush." The ubiquitous long-leafed pine constitute the most important forest growth for many miles around Summerville. These trees are not only planted constantly, but a law has been enacted which forbids their destruction.

The chief climatic events of this resort are illustrated in the following table arranged by Dr. A. H. Hayden, the Health Officer of Summerville :—

SUMMERVILLE, SOUTH CAROLINA. Climatic Data from January, 1899, to January, 1903.

Temperature F.	Nov.	Dec.	Jan.	Feb.	Mch.	Apr.	May	Sept.	Year
Average mean	59.3	47.5	46.8	46.6	54.4	59.2	80.1	72.5	
Extreme (Maximum)	79.5	74.7	74.8	76.2	81.2	83.7	96.2	91.0	
Extreme (Minimum)	29.5	19.0	21.4	16.7	27.6	34.7	65.2	53.5	
Mean Maximum	66.5	58.7	58.4	56.3	67.7	68.1	88.3	52.7	
Mean Minimum	51.2	46.2	36.8	37.1	44.9	50.2	71.2	65.2	
Average daily var.	15.3	12.5	21.6	19.2	22.8	17.9	17.1	17.5	
Average monthly var.	51.2	55.0	53.4	57.4	53.6	49.0	31.0	37.5	
Average relative humidity (recorded only part of period) per cent	77.4	76.8	70.8	70.9	72.5	73.0	83.5	79.5	
Precipitation (average in inches	2.77	3.73	3.49	4.67	3.01	4.08	5.25	3.56	59.16
Wind (prevailing direction)	N.E.	S.W. N.E.	S.W.	S. N.W.	S.W.	S. E.	S.W.	N.E.	N.E. S.W.
Weather (average number clear days	18.2	15.0	13.0	10.4	13.4	15.7	15.2	19.7	
Fair days	6.7	7.5	9.2	10.0	11.2	9.2	12.5	5.2	
Clear and fair days	24.9	22.5	22.2	20.4	24.6	24.9	27.7	24.9	
Cloudy days	5.0	8.2	8.8	7.6	6.4	5.0	3.2	5.0	

The average yearly temperature at Summerville for 1903 * was 63 deg. F., highest 95 deg., lowest 17 deg. The annual rain-fall for the year was 51.44 inches.

Summerville would appear to be an eligible winter resting place for the valetudinarian who finds himself unable to withstand in comfort the severities of a more northern climate. It may safely be recommended to persons suffering from anæmia, nervous exhaustion, insomnia and in most cases from general debility. The mild and equable atmospheric conditions with an abundance of sunshine, especially adapts the place for persons suffering from pulmonary complaints, notably winter bronchitis, and early tuberculosis. Some rheumatic cases of long standing are markedly benefited, while others show no improvement. The varied diversions of Summerville and its environs mark it as an attractive point for the winter tourist or recreation seeker.

Mineral springs are quite numerous in South Carolina, but few have become known beyond the limits of the State. They are generally of the alkaline-saline or chalybeate type. Some of the old spas, well known in ante-bellum days, have been permitted to lanquish, while newer ones are still developed from time to time. For a full account of the South Carolina Springs with analyses, etc., the reader is referred to the author's treatise on the "Mineral Waters of the United States" (New York and Philadelphia, Lea Brothers & Co.). The following epitome covers briefly the most important localities now in use:

Ambler Springs, Pickens County. These springs are two in number and are located six miles north of Pickens Court House at a level of two thousand feet above the sea. There is a small hotel at the Springs and they are used as a resort during the summer months. The water is of the light alkaline-calcic type and contains 646 grains of solids per U. S. gallon. It is said to be useful in dyspepsit and skin affections of the eczematous class.

Chicks Springs, Greeneville County. These springs are about ten miles from the city of Greeneville, from which they are reached by the Southern railway. The location in a picturesque rugged country is 1,200 feet above the sea level. Paris Mountain, a spur of the Blue Ridge, 2,054 feet high, is only three or four miles distant. The climate in this region is very salubrious and well adapted for pulmonary cases. The air in winter is characteristically dry and the weather as a rule clear and sunny.

There are two springs one hundred and fifty feet apart. The principal spring is of the calcic-chalybeate type and contains 40 grains of solids per U. S. gallon. Its waters are highly recommended in atonic dyspepsia with hepatic congestion. It is said also to be a helpful auxiliary in Bright's Disease.

Glenn Springs, Spartanburg County. These springs are located twelve miles from Spartanburg, with which they are connected by rail. The writer is informed (1906) that an electric line between the two points is in prospect. The springs are located in a lovely section of country broken by granite and sandstone hills. The springs have recently come into possession of an enterprising company and plans for a modern hotel and other improvements are under way. The water is of the alkaline-calcic class and contains 97.55 grains of solid chemical contents per U. S. gallon. There is said to be a considerable percentage of lithia. It is recommended by physicians of the State in torpor of the liver and bowels, hemorrhoids, dyspepsia and in functional derangements of the female generative organs.

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* The annual reports of the Weather Bureau for 1904-1905 are not yet for distribution. (March, 1906).

Harris Lithia Springs, Laurens County. These springs have their location in a beautiful rolling section, broken by picturesque hills. They are reached by the Seaboard Air Line to Cross Hill, thence two and a half miles by carriage to the springs. The hotel and cottages are open to visitors during the months of June, July, August and September.

According to the analysis of Prof. R. Ogden Doremus the water is impregnated with 111 grains of solids per U. S. gallon. It is of the alkaline-calcic and lithic type. The water is highly effervescent and very agreeable to the taste. It is a very pleasant table beverage and quickly corrects acidity of the stomach. It overcomes constipation and is useful in rheumatic arthritis gout and other uric acid conditions. Some practitioners believe that the water will quickly produce a diminished excretion of sugar in diabetes mellitus. It is used commercially and has a wide sale.

Reedy Creek Springs, Marion County, P. O. (1906) Bingham. This small resort is reached by the Atlantic Coastline. The location is in a level clay-soil district, covered by the long-leafed pine plentifully interspersed with oaks. The springs are a hundred miles from the ocean. They are three in number and have a considerable local reputation. They contain iron, magnesia, lime and sulphur, the total solids being about 30 grains to the gallon. The waters are said to be very useful in obstinate cases of dyspepsia.

West Springs, Union County. These springs are located four miles southeast of Glenn Springs at a level of two thousand feet above tidewater. They are surrounded by picturesque hills covered with extensive forests of pine, spruce, beech, oak, etc. There are several springs in the neighborhood, but only one in use. It is of the alkaline-saline class and contains 30.88 grains of solids per gallon. The water is considerably used by South Caroline physicians in diarrhœa and dyspeptic troubles. It is said to possess excellent virtues in chronic catarrhal conditions of the genito-urinary tract, i. e. gonorrhœa, gleet, leucorrhoea, etc.

ERRONEOUSNESS OF THE RADIOMETRIC INDICATIONS FURNISHED BY PLATINO-CYANIDE OF BARIUM *

BY CARLO COLOMBO, M. D., OF ROME, ITALY

Lecturer on Physical Therapeutics at the Royal University of Rome, Director of the Central Institute for Physical Therapeutics, etc.

THERE are, essentially, two methods proposed for the quantitative measurement of the dose of the Roentgen rays: one constituted by the electric measures, the scientific method *par excellence;* the other based on special reactions of a chemical nature which are presented by certain substances when exposed to the rays:

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* Read at the First Italian Congress of Physiological Therapy, at Rome, Italy, March 25-27, 1906.

The electric measurements have not yet entered into the practical field for many and divers reasons, although various inventors of apparatus believe, each on his own part, that he has solved the difficult problem.

Great success, on the other hand, has attended the radiometers based on the chemical reactions of substances exposed to the rays. Of these the most universally known are the chromoradiometer of Holzknecht, and the X-Radiometer of Sabouraud and Noire.

Even of these two apparatus the first, which has been the origin and starting point of all the others, has now become a museum curiosity, for since 1903 it has been impossible to find it in commerce, and it seems that its inventor will have no more made.

The field, therefore, remained open to the X-Radiometer of Sabouraud-Noire, and this apparatus has thus spread through the world as the sole means, at once simple and practical, of measuring, not indeed the mass of Roentgen radiation emitted by the Crookes tube, as an electric measure would, but the quantity of rays absorbed in a given time by the part exposed.

It is, therefore, interesting to know what value the apparatus of Sabouraud and Noire really has because upon its efficiency depends much of the good or evil that may be produced by radiotherapy.

It is known that the radiometric method of Sabouraud-Noire consists in exposing to the rays pastilles of platino-cyanide of barium cut from an ordinary fluorescent shield such as is used in roentgenoscopy. The unused pastilles are of a pale green color, but exposed in the vicinity of a Crookes tube in action they become slowly yellower, and pass from pale yellow to orange yellow and finally to a brown color.

The inventors of the apparatus (1), profiting by this reaction of the platino-cyanide of barium, have been able to establish, by very numerous experiments, a kind of colormetric scale in proportion to the quantity of Roentgen rays absorbed by this salt.

Thus, when the pastille of platino-cyanide of barium exposed to the rays has assumed an orange-yellow color similar to that of the sample supplied with the apparatus, the inventors affirm that it has absorbed a quantity of rays corresponding to the maximum dose that the human skin can bear without evil consequences such as erythema, loss of hair, and desquamation; that is, a radiodermatitis of the first degree.

And since this does correspond exactly to that indicated by the fifth gradation of Holzknecht's chromoradiometric scale, it was agreed to value it as equal to five Holzknecht units (5 H.).

The pastille of platino-cyanide of barium should be placed, according to the instructions issued with the apparatus, midway between the anticathode of the tube and the surface to be irradiated, or better at 7½ cm. from the anticathode, for Sabouraud and Noire consider best a distance of 15 cm. between the anticathode and the surface of the part to be exposed to the X-Rays.

The pastille passes from pale green to orange in a longer or shorter space of time according to the greater or less quantity of rays which it absorbs.

These fundamental axioms were accepted by all, and the sample coloration scale furnished by Sabouraud-Noire constitutes in radiotherapy the limit dose.

But by degrees doubt arose as to their exactitude. Already many observers had remarked that, administering to their patients doses of rays accurately controlled by the radiometer, and certified by it as innocuous, they had, on the contrary, produced serious radiodermatitis; while, in other cases, doses considered, on the authority of the pastille, as very high indeed, had not produced any sensible reaction in the patient.

And they fell back on the hypothesis of individual idiosyncrasy!

Surprises of this kind also happened to myself, and I was certain that the error could not depend on the apparatus producing the rays.

Defects of insulation of the coil, oscillations of influence in an electrostatic machine, and above all variations in the functioning of the interrupter, might cause considerable variation during the course of an application of Roentgen rays in the working of the tube and in its production of radiance. But I could command an installation which excluded all these inconveniences, for I used a Gaiffe apparatus with a closed magnetic current (without interrupter), functioning by means of the street current, alternate monophase, at 102 volts with 43 periods.

Two Villard valves, interposed in derivation in the circuit, separated the two alternate waves letting one only pass into the tube, always in the same direction. A Beclere spintermeter was inserted to measure the length of the equivalent spark and, by this, the degree of hardness of the tube.

A special Gaiffe milliamperemeter gave the measurement of the intensity of the secondary current which traversed the tube, and served to control in a certain way the output of the tube itself.

Any cause of error could therefore proceed only from the inexact indications of the X-Radiometer.

In order to understand the phenomenon I instituted a series of experiments.

Experiment I.

I put in circuit a Chabaud tube, large size, with Villard osmoregulator. Putting the osmoregulator in action I brought the tube gradually to a degree of hardness corresponding to No. 3 of Benoist's radiochromometer, and made it function with a medium intensity of production. The other conditions surrounding the tube were as follows: 55 volts in the primary circuit, 12 cm. of equivalent spark, 0.3 ma. of intensity in the tube circuit.

The anticathode scarcely lost its metallic color and did not become red.

Having placed the pastille of platino-cyanide of barium at 7½ cm. from the anticathode, I set this to work, maintaining the tube constantly at the same degree of hardness. After 75 minutes I obtained the orange-yellow color similar to the sample of the radiometer.

This allowed me to conclude that my tube, maintained constantly at the above-specified regime of work, gave a dose of 5 H. in 75 minutes, that is, 1 H. in 15 minutes, at a distance of 15 cm. between anticathode and skin.

Experiment II

Consecutively, using the same tube, I modified the regime of work in order to obtain less penetrating rays, such as are used to treat superficial affections of the cuticle; and I softened the tube to a degree corresponding to 6 Benoist.

With this regime of work the constants were as follows: 55 volts in the primary circuit, 10 cm. of equivalent spark, 0.4 ma. of intensity in the circuit of the tube.

The anticathode takes a cherry-red color.

The pastille of Sabouraud-Noire reached the sample color in 68 minutes; thus the tube administered 1 H. in 13½ minutes at a distance of 15 cm.

And this is logical, for the tube being softer in the second experiment and the resistance to the passage of the current less, this becomes utilized in a larger proportion, producing a more abundant mass of X-Rays, although less penetrating than the first.

Experiment III

I again modified the regime of the tube, always the same tube, making it very soft, so as to produce rays whose penetration should not exceed 3 Benoist.

I set the apparatus to work with the following regime: 40 volts in the primary circuit, 5 cm. of equivalent spark, 0.6 ma. of intensity in the circuit of the tube.

The anticathode becomes incandescent to the degree of bright redness.

It was evident, only by looking at the luminous hemisphere, that the mass of rays produced by the tube under these conditions was much inferior to that produced by the same tube with the regime of work of Experiment II.

This was also evident from the appearance of the fluorescent screen.

And yet the pastille of platinocyanide of barium took the orange-yellow color of the radiometric sample in 57 minutes, corresponding to the dose of 1 H., in 11½ minutes, at the usual distance of 15 cm. from the skin.

There was evidently an error and the cause of it was to be sought.

I was able to leave out of the question any error of observation, for I repeated the experiment several times, always with the same result.

And I also took care to look at the pastille always by daylight, and as nearly as possible at the same hour, and with the same incidence of the luminous rays; for I will show later on that these precautions are not unimportant in judging of the coloration of the pastille.

Experiment IV

I then had recourse to another tube of the same Chabaud pattern, but of smaller dimensions.

As this was a tube of the same make with anticathode of the same metal and glass of the same quality, the same regime of work used for the larger tube should have given with this one the same intensity of radiation. On the contrary, when the tube was regulated to 6 B. as in Experiment II., and set to work with the following constants: 55 volts at the primary, 10 cm. of equivalent spark, and 0.4 ma. of intensity in the circuit of the tube, with a cherry-red incandescence of the anticathode, the pastille reached the sample colorization in 86 minutes, corresponding to the dose of 1 H. in 17 minutes.

Surprised at this result, I observed by the fluorescent screen the intensity of radiation in the two tubes working under the same regime, and I convinced myself that the intensity was the same.

When I paid attention to the fact that the pastille, in this experiment, was indeed at the regulated distance of 7½ cm. from the anticathode, but because of the smaller diameter of the tube, it was distant from its walls by about 4 cm., while in Experiment II. it was at only 2 cm. from the walls of the tube which had a larger diameter, it was evident that the pastille, in Experiment IV., placed further from the walls of the tube, although it absorbed the same quantity of rays as in Experiment II., was not equally well exposed to receive an equal quantity of calorific irradiation.

So then, the calorific rays, as well as the Roentgen rays, contribute to change the coloration of the pastille.

This observation explained for me many facts which I had not succeeded in interpreting, and first of all the erroneous result of Experiment III. In fact, in that experiment, the pastille was evidently not able to absorb a great mass of rays, but could perhaps take in a larger quantity of calorific rays, as indicated by the fact that the platinum was more incandescent. Once entered on this order of ideas I wished to verify, by other direct experiments, what value was to be attributed to the action of the calorific rays in producing the variation in color of the pastille of platino-cyanide of barium.

Experiment V

I placed a pastille of platino-cyanide of barium near an ordinary electric incandescent globe, at a distance of about two centimeters from its glass wall, so as to produce conditions analogous to those of the Crookes tube.

After one hour and three minutes this pastille had assumed the orange-yellow color of the Sabouraud-Noire sample, perhaps a trifle browner. I measured with the thermometer the temperature to which the pastille was exposed. It was about sixty degrees Centigrade.

Experiment VI

To exclude direct irradiation from the incandescent light I interposed between the globe and the pastille a glass bell colored green; the pastille was thus distant from the walls of the globe about five centimeters, and was exposed to a temperature, measured by the thermometer, of about twenty-eight degrees Centigrade. It took the color of the sample in a little more than six hours.

Experiment VII

To exclude totally the action of the luminous rays, I made another trial. I placed the pastille in the vicinity of an ordinary stove, at a distance of about ten centimeters from its surface. It was thus exposed to a temperature of about forty-five degrees Centigrade. The pastille assumed the characteristic coloration in about three hours and forty-five minutes.

It was thus demonstrated that the platino-cyanide of barium is considerably influenced by calorific rays, and the suggestion is confirmed that the change of coloration in the pastille of Sabouraud-Noire does not correspond exactly to the quantity of Roentgen rays absorbed by it.

This mode of action of the platino-cyanide of barium also clears up the following facts, which otherwise would remain incomprehensible.

It often happened to me to obtain the characteristic coloration, with the regime of work in Experiment II., in from sixty-five to sixty-eight minutes, using pastilles which I kept in a fairly dry place, while it needed from twelve to fifteen minutes more, with the same regime of work and with the same tube, when I used pastilles kept in a very damp place.

The scientific explanation of this phenomenon is given by Bordier and Galimard (2) who have succeeded in demonstrating that the passage of the platino-cyanide of barium from a pale green color to orange-yellow is due to a process of dehydratation or of dessication, which takes place equally whether it be exposed to the action of Roentgen rays, to moderate heat or solar irradiation, or whether the hydrate salt be kept under a closed bell in the presence of sulphuric acid.

Thus it is natural that pastilles which are more hydrated, because kept in a damp place, should require a longer time than those kept in a dry place, to become completely dehydrated.

I have already remarked on the fact that the change of color in the pastille of Sabouraud-Noire is differently estimated, according as it is observed by daylight or by artificial light; at a certain incidence of the light rays rather than at another.

Messrs. Sabouraud and Noire say nothing on this point in the notes attached to their apparatus, but it is evident that the estimation should be made by solar light.

With the regime of work described in Experiment II., the pastille placed at 7½ cm. from the anticathode acquired the characteristic coloration after fifty minutes, *provided the pastille was observed by the half-light of twilight*, and assumed the orange-yellow tint still more quickly, in about twenty-six minutes, *if the pastille was observed by the light of an ordinary electric incandescent globe of sixteen candle-power.*

The error, in this case, assumes enormous proportions, for it reaches sixty-two per cent.

There is also a notable difference in the estimation of color change, according as the pastille is looked at in such a way that the light falls perpendicularly upon its surface, or in an oblique direction. In the first case it appears slightly paler.

From what has been stated it results that complete reliance cannot be placed on the exactitude of the dose measurement furnished by the X-Radiometer of Sabouraud-Noire.

I do not mean, indeed, to conclude that this apparatus should be banished from dosimetric use in radiotherapy, for when judiciously employed it is always of great utility. But one should not be satisfied simply with the data furnished by the pastille of platino-cyanide of barium. It is necessary to have recourse to other elements of control, and for the present, until an apparatus be provided which shall be scientifically exact in measurement, we must be content with the means which are at our disposal.

A good control, in the meantime, is the special Gaiffe milliamperemeter;

no radiologist should be without it.

It is a general conviction that the only exact measurement will be given by the electric radiometer of the future.

And who knows if such is not destined to be the electrostatic radiometer which is in course of preparation by Francois(3), or the radiogenometer of Alfred Dean?

That is what a not remote future will show.

(1) Sabouraud et Noire—Traitement des teignes fondantes par les Rayons X. (Annales d'Electrobiologie et Radiologie, No. 1, 1905.)
(2) Bordier et Galimard—Action des Rayons Xsur les platino-cyanures, cause de leur regeneration, etc. (Archives d'Electricite Medicale, 1905.)
Bordier—Sur la regenerationdes ecrans, etc. (Archives d'Electricite Medicale, 1905.)
(3) E. A. W.—Le measure de la quantite en Radiotherapie. Un radiometre electrostatique. (Journal de Physiotherapie, 1906.)

EDITORIAL

AMERICAN MEDICAL EDITORS' ASSOCIATION

THE Thirty-seventh Annual Meeting of this society was held at Boston on June 4, under the presidency of Henry Waldo Coe, M.D., of Portland, Oregon. In its many years of existence this was the most satisfactory session ever held, not only in point of attendance, but as regards the character of the papers presented and the large number of applications received for membership. This association now numbers over one hundred and forty-five members, representing ninety-two of the leading medical journals in America.

The following programme was presented and the papers were enthusiastically discussed:

President's address, Henry Waldo Coe, M.D.; "The Repeater in Medical Literature," Frank P. Foster, M.D.; "The Business of a Medical Editor," Harold N. Moyer, M.D.; "Proprietary Advertising," W. C. Abbott, M.D.; "Some Thoughts in Connection with the Editing of Original Articles, and on Medical Book Reviews," Walter M. Brickner, M.D.; "The Profession of Medical Editorship," James Evelyn Pilcher, M.D.; "Independent Journalism a Necessity for the Profession," Kenneth W. Mellican, M.D.; "Independent Medical Journalism," J. J. Taylor, M.D.; "The Official State Journals *vs.* the Private Medical Journal," William J. Robinson, M.D.; "Original Papers and Abstracts as Seen in Medical Journals," T. D. Crothers, M. D.; "Proper and Improper Medical Advertisements," John Punton, M.D.; "Psychiatry and Neuriatry in General Medical Journals," C. H. Hughes, M.D.; "The Scope of the Official State Medical Journal," Charles Wood Fassett, M.D.

The officers elected for 1906-07 were as follows:

President, James Evelyn Pilcher, M.D., Editor Journal of the Militaιy Surgeons of the United States; First Vice-President, Frank P. Foster, M.D. Editor, New York Medical Journal; Second-Vice President, Charles F. Taylor, M.D., Editor, Medical World; Secretary and Treasurer Joseph MacDonald, Jr., M.D., Managing Editor, American Journal of Surgery, New York.

The annual banquet was held at the University Club on Monday evening, about seventy-five covers being laid. Among the speakers were Surgeon-General Walter Wyman, U. S. Hospital and Marine Service, etc.; Major Jefferson Randolph Kean, United States Army; George B. Shattuck, M.D., Boston; Henry O. Marcy, M.D., Boston; Frank P. Foster, M.D., New York; Andrew C. Smith, M.D., President State Board of Health, Portland, Oregon; Carlos MacDonald, M.D., New York; Britton D. Evans, M.D., Morris Plains, New Jersey; W. C. Abbott, M.D., Chicago; Charles Green Cumston, M.D., Boston. The President, Dr. Coe, presided as toastmaster.

THE FIRST ITALIAN CONGRESS OF PHYSIOLOGICAL THERAPY

The First Italian Congress of Physiological Therapy was held at Rome on the 25th, 26th and 27th of March, 1906, under the presidency of the Honorable Professor Guido Bacelli. Professor Carlo Colombo, of Rome, was the secretary. At this convention the National Italian Association of Physiological Therapy was founded and organized.

Papers were read by the following physicians: M. Coleschi, Negro, Gramegno, Pescarolo, Quadrone, Respighi, Rando, Bertolotti, Cessaro, Carpi, Nigano, Zontana, Colombo, Esdra, Ineryio, Gavazzinni, Nincenzo, Agostino, Scarpa, Sigalin, Giglio, Codivilla, and Franco.

Among the recommendations of the official committees were the following: That physicians who are going to practice physiological therapy, either in their private practices or in public institutions, should devote time to taking a special course in physiological therapeutics, and that a chair of physical therapeutics should be established in all universities.

A NEW DEPARTMENT

In compliance with repeated suggestions it has been decided to institute in the next issue of THE ARCHIVES, a Department of Queries and Answers. Many physicians who are taking up the practice of physiological therapy desire information regarding many points that come up to them individually, and it will be the aim of this Department to enlighten practitioners upon such points. Questions should be submitted by the first of the month preceding the issue in which it is desired that the answer should appear. It is believed that this department will materially increase the usefulness of THE ARCHIVES to its subscribers.

ELECTROTHERAPY

Treatment of Chronic Non-Suppurative Affections of the Middle Ear by Tubo-Tympanic Galvanization. (*Dr. Malherbe, Annales d'Electrobiologie et de Radiologie, March,* 1906.) This is the best treatment whether in cases of tubo-tympanitis (otitis hyperplastica) or of tympano-labyrinthitis (early adhesive tympanitis, or sclerematous tympanitis). In the first case it softens and destroys newly-formed fibrous bands, and mobilizes the transmitting ossicle. In the second, it slackens the morbid process and alleviates the painful symptoms of the affection. The instrumentation is very simple, and consists in, (1) the street current with a reducer of potential, a milliammeter, and a watch; (2) special bougies entirely insulated except at both their extremities. The other extremity ends in a slightly flattened platinum olive, the other extremity is connected with the negative pole; (3) catheters of different sizes, preferably made of silk.

After introducing a catheter in the Eustachian tube, we push through this catheter a bougie which we connect with the negative pole. The positive pole is formed by a flexible metallic electrode, covered with chamois skin, and is placed on the arm or the neck of the patient. The intensity must vary in different cases, 2, 3, 5 or 6 ma. The average duration of a treatment is from 5 to 10 minutes. Applications must not be painful or cause vertiginous sensations. Results are most encouraging.

Action of Hydro-Electrical Baths in Some Cardio-Vascular Affections. (*Drs. Albert-Weil and Mougeot, Journal de Physiotherapie, May* 15, 1906.) First note devoted to triple-phased currents. Three patients were submitted to hydro-electrical baths with alternating triple-phased current during twenty minutes and the effects on the pulse and on the arterial and arterio-capillary pressure carefully noted. The curves of the radial and the capillary pulses were recorded and the area of cardiac projection was measured before and after the bath. The instruments used were the very best known. The baths were given at 34-35 degrees C., and every possible precaution was taken in order to avoid possible mistakes or auto-suggestions on the experimenters' part. The current was supplied by a small dynamo fed by the continuous municipal current.

The results were: (1) in all cases, a considerable decrease of the arterio-capillary pressure; (2) three times out of four, an important decrease of the arterial pressure, while in the fourth experiment the latter was not influenced; (3) constant modifications in the radial pulse chart showing an increase in the amplitude of the systolic wave, an accentuation or a reappearance of the wave of arterial elasticity, and a more marked dicrotism; (4) no increase in the amplitude of the capillary pulse; (5) a diminution of the cardiac area, so much the more marked as the heart was itself more dilated. Therefore it may be hoped that such baths will constitute a rational treatment of hypertension.

Facial Paralysis. (*Francis B. Bishop, Journal of Advanced Therapeutics, June,* 1906.) Facial paralysis is one of the most common of all localized paralyses, and owing to the fact that the seventh nerve supplies all the muscles of expression of the face, is the most disfiguring. It may be due to a lesion in its center in the medulla, or to any or all its branches distributed upon the face.

It is generally unilateral except when due to a lesion of the medulla or pons. A lesion in the nerve between the nucleus and its branches of distribution is called Bell's Paralysis. This is the most common type and is apt to develop suddenly. The paralysis is usually complete in a few hours, and there usually exists some pain in and swelling over the sub-auricular fossa.

All the muscles of the face on the side affected are generally paralyzed and the appearance is very characteristic. There is a total loss of expression on that side, an effort to laugh or smile draws the mouth around to the sound side, and the eye cannot be closed on the affected side. The patient cannot wrinkle the brow and the tears fill the eye and roll down the cheek. There is usually for a few days very little change in the electric excitability of the nerves and muscles, but gradually the reaction of degeneration is thoroughly established.

This condition may go on for weeks or months before normal reaction returns and continues in many cases after the patient has recovered some control over the paralyzed muscles. The disease is undoubtedly a neuritis and is due to a toxic or infectious influence.

The inducing cause in 70 per cent of the cases is exposure to cold. Diseases of the middle ear may easily involve the facial nerve as this nerve lies so near the tympanic cavity and is separated from it by only a thin lamella of bone.

It has been the opinion of the older writers that electricity should not be applied during the first two or three weeks, but experience has taught that the earlier the electrical treatment is applied the better.

Bishop's treatment is to apply a mild continued current, four or five milliamperes in strength, for fifteen or twenty minutes each day, or second day. He uses a large pad connected with the positive pole if the muscles are wasting, applied as high up the neck as possible. As soon as the peripheral motor nerves respond to the induction current this should be used, but at first very gently. In bad cases there is apt to be deformity for some time.

Treatment of Nervous Dyspepsia and of Nervous Dyspeptic Troubles. (*M. Bienfait, Annales d'Electrobiologie et de Radiologie, March,* 1906.) In most chronic dyspepsias there is a neurotic condition of the solar plexus upon which the continuous current has a most beneficial action. Naturally, this is no " sure cure " for all dyspepsias and the usual treatment directed toward the cause must be kept in mind. The negative pole is applied over the epigastrium : the positive pole is placed on the back near the last dorsal vertebra. Current is increased rapidly up to from 20 to 30 ma according to tolerance, and is applied during 10 minutes. In cases of gastralgia the treatment ends with a light revulsion with a faradic brush. If cephalic troubles be predominant, the dorsal electrode should be placed very high on the nape of the neck against the occipital bone. In such cases, the gustatory nerves are certainly reached by the current for the patient notices a metallic taste in his mouth. If there is persistent headache, electrization of the brain should be resorted to, one electrode on the nape of the neck, the other on the forehead. Static electricity and high frequency currents are useful adjuvants in case of concomitant hysteria or nutritive disturbances.

Indications for and Technic of Electrical Applications in Constipation. (*Dr. Burais*, *Annales d' Electrobiologie et de Radiologie*, *March*, 1906. Physical agents are chiefly indicated in atonic constipation. First treat hemorrhoids or fissures, if present. To stimulate the contractility of the gut, the writer introduces into the anus a long rubber tube containing a tin tube shorter than the rubber one. The free extremity of that tube is connected with the electrical source, and the current of electricity can be easily regulated. When the gut has been filled up with a sufficient quantity of salt water, the operator places over the abdomen a large pad of felt or absorbent cotton soaked in salt water on which he places a sheet of tinfoil of at least 15 x 21 centimetres, and connects the whole pad with the positive pole of the electrical battery. Current is turned up to 15, 20, or 30 ma., according to susceptibility. The maximum intensity is maintained for about 10 minutes and slowly reduced to 0. One or two stools are the consequence of this treatment. For habitual constipation, treatments must be given every two or three days. Of course treatment directed to the cause has to be continued if necessary.

Zoster Occurring After an Exposure to High Frequency and Cured by Continuous Currents. (*Dr. P. Ch. Petit*, *Bulletin Officiel de la Societe Francaise d'Electrotherapie et de Radiologie*, *May*, 1906.) A patient thirty years old is treated by ozonization for a partially healed tuberculosis. After an exposure to high frequency, a zoster develops which is submitted to continuous currents : a positive electrode measuring 25-15 cm. is placed on the posterior group of vesicles near the spine; a negative electrode of the same size is placed around the thorax and covers the other vesicles. The current is raised progressively to 60 ma. Immediate improvement. Next day, 37 ma., 13 volts. Four more treatments were given, one every day. Perfect cure. High intensities should be used in the galvanic treatment of zoster. The latter method is valuable considering the frequent failures of other medications, most of which are only a disguised expectant treatment.

Furuncles and Anthrax.—Their Treatment by Morton's Wave Current and Electrolysis. (*Cirera Salse, Annales d'Electrobiologie et de Radiologie, March,* 1906.) The technique of electrolysis in boils is as follows: a steel needle (negative pole) is thrust into the boil, and a current of 5-10 ma. is made to pass during five minutes. Or a fine probe is used to catheterize the duct of the sebaceous gland. This latter method is safer and less painful.

But most remarkable results are obtained with the use of Morton's currents. The induced static currents are generated by a static machine each pole of which is connected with a condenser. The external armature of one of these condensers is connected with the earth and the other with the patient. The balls of the exciter are more or less distant according to the intensity sought. The communication with the patient is effected through a glass-muffled electrode which is moved over the infected region during five or six minutes. The intensity must be sufficient to provoke a contraction of the superficial muscles. This intensity would be dangerous for the McIntyre vacuum electrodes, so we cannot use these, but very suitable electrodes may be constructed as follows: Take a test-tube, or one of those small vials used by naturalists to preserve small anatomical specimens, fill it tight with tinfoil, and close with sealing wax. A metallic wire, touching the tinfoil and passing through the wax will make a good current connection. A bit of glass long enough will make a handle. By choosing different test-tubes and vials of uniform thickness, we may prepare a nice set of electrodes.

The method is always painful, more or less according to the tolerance of patient, but always enough to necessitate local anesthesia. Four favorable cases are related.

Method and Dosage Apparatus in Franklinisation. (*L. Benoist, Annales d'Electrobiologie, April,* 1906.) Benoist's electrodensimeter is already familiar from a description which appeared a year or so ago. It consists of a metal leaf electrometer enclosed in a case and with a scale graduated both in degrees of arc and in franklins per square cm. A franklin is one C. G. S. unit of electrical quantity and is $\frac{1}{3 \times 10^9}$ coulombs. The charge from five square cm. of the back of a patient's hand when upon the insulated platform of a static machine is transferred to the electrometer by a metal disk with an insulated handle; the disk is covered by a cylinder to prevent loss of charge in passing through the air from the patient to the electrometer. The apparatus acts also as a voltmeter since a charge of one franklin per square cm. requires a potential of 30 volts. With the static machines that the author uses the density of charge given to the patient is from 5 to 20 or 30 franklins per square cm. His purpose is that the dosage of static electricity be expressed as so many minutes at a density of so many franklins.

Monolyth Condenser for High Tension Currents. (*O. Rochefort, An-*

nales d'Electrobiologie et de Radiologie, April, 1906.) Devised to avoid loss of power by effluvia around the armatures. Is formed by two circular plates, separated from one another by a glass disk much larger than the metallic plates; each metallic plate is also covered by a glass disk, and the three glass disks and the two metallic plates are soldered together by heat. The capacity of such a condenser is 0.00167 microfarad, slightly less than that of a Leyden jar (0.00174 microf.).

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The D'Arsonval and Other High Frequency Currents, What They Are and What They Will Do. (*Henry G. Piffard, New York Medical Journal, June* 16, 1906.) In an interesting article Piffard refers to the striking difference between the physiological effects of high tension currents and the static induced current and utters a word of warning in regard to mistakes in methods of connection: With a spark gap of one-eighth inch the static induced current is already painful, while with the d'Arsonval current a spark gap of three or four inches is frequently employed.

If a static machine is employed as the source of high tension energy, the large jars are put in place and the ends of the solenoid or spiral are connected to the outer armatures of the jars. If cords and electrodes be now connected with the outer armatures of the jars, the patient holding the electrodes with the machine in action, will receive the d'Arsonval shunt current. This method of connection, however, should never be made use of. He has seen such connection and alludes to it simply to point out its dangers. If by any chance the connection between either end of the solenoid and one of the jars should be broken or become loose, the current would no longer be a d'Arsonval, but would be the Morton current, and if there was a spark gap of three or four inches, as would be proper with d'Arsonval, the effect on the patient would be extremely disastrous, possibly fatal. So far as the author is aware this accident has never happened, but he deems it well to point out the possibility of its occurrence. The cords should be invariably connected to the solenoid, for if anything should break loose it would be a case simply of "nothing doing," and the attachments could be readjusted at leisure.

If the outer armature of the jar on the negative side of the machine be grounded, a machine with 14 revolving plates revolving at a speed of about four hundred revolutions per minute will yield a current through the patient of about one hundred and fifty milliamperes with the pole pieces separated three inches. The current is imperceptible to the patient if the electrodes are in firm contact with the skin. If, however, one of them is removed a short distance from the skin, one-half to three-quarters of an inch, a sharp spark will pass.

The effects of high frequency currents on a person in health have been found to be as follows:

"1. The number and amplitude of the respiratory movements are augmented.

"2. The respiratory combustions (intake of oxygen and outgo of carbonic acid) are notably increased, d'Arsonval finding his own carbonic elimination more than doubled.

"3. Tripet and Guillaume, working independently, found that there was notable increase in the rate of hæmoglobin reduction.

"4. D'Arsonval, and separately de Bonniot, found the carbonic elimination augmented; further confirmed by Bordier and Lecomte.

"5. Apostoli and Berlioz found, as a result of 761 analyses of the urine of 280 patients, increased elimination of solids, confirmed by Bordier and Lecomte, on animals and men (chiefly urea, uric acid, and phosphoric acid); Denoyes, Marthe, and Rouviere in collaboration, experimenting with three healthy men, examining the urine by chemical analysis, toxicity tests, and cryoscopy, found increase in the volume of the urine, together with increase of urea, uric acid, total nitrogen, phosphates, sulphates, and chlorides eliminated in twenty-four hours; and increase of the urotoxic coefficient. Cryoscopy afforded concordant evidence.

"It may further be noted that in the cases of some of the animals experimented with, there was notable loss of weight."

The Action on Bacteria of Electrical Discharges of High Potential and Rapid Frequency. (*Alexander G. R. Foulerton and Alexander M. Kellas, The Lancet, May* 19, 1906.) In the course of an inquiry into the action of "high frequency" electrical discharges as they are employed in medical work the nature of the action of such discharges on bacteria was specially investigated. The majority of the experiments were carried out under the following conditions: The current obtained from the electric lighting main was first transformed into a rapidly oscillating current of very high potential by means of an alternator driven by a motor and then into an oscillatory discharge of rapid frequency by means of a condenser and spark-gap. The bacteria were exposed to the action of the discharges whilst suspended in distilled water contained in test tubes. A short length of platinum wire was sealed through the bottom of the test tube and dipped into a layer of mercury at the bottom of the vessel in which the test tube was suspended for cooking purposes. From the mercury in the cooling vessel an "earth wire" passed to a gas supply pipe. The discharges were sprayed on to the surface of the bacterial emulsion from a platinum disc with nine wire points projecting downwards and kept at a distance of about 2.5 centimeters above the fluid.

With this arrangement of apparatus the bacteria in the emulsion were exposed (1) to the action of the electrical discharge, and (2) to the action of the electrical current as it subsequently passed through the fluid on its way to earth. Certain modifications of the apparatus were used occasionally but the crucial experiments were carried out with the arrangement described.

It appeared as if four possible factors might be concerned in the causation of the germicidal effect observed in these experiments: (1) the action of the light rays resulting from the discharge; (2) the action of the heat rays resulting from the discharge; (3) the action of germicidal substances formed in the air as a result of the discharge and then taken up in solution by the emulsion; and (4) the direct action of the electrical force itself on the bacteria and apart from concomitant chemical and other actions.

In all the experiments in which a decided germicidal effect was observed it appeared, however, that this was due entirely to the action of substances formed as the result of electrical action on the atmosphere in which the discharge occurred, and it appeared that under the time conditions of the experiments the electrical force employed was not capable of exercising any injurious action on the bacteria tested. And it is probable that when in medical practice cases of lupus and certain other cases in which there is an exposed ulcerated surface are treated by "high-frequency" discharges, the results produced are due entirely to the action on bacteria of nitrous and nitric acids formed in the neighboring air. And from a therapeutic point of view the use of high frequency discharges in such cases must be looked upon mainly as an efficient method for bringing germicidal substances in a nascent and very active condition into contact with the bacteria present in the lesion exposed to the action of the discharge.

The Influence of High Frequency Currents on the Surface Temperature of the Human Body. (*W. F. Somerville, Medical Electrology and Radiology, May,* 1906.) As the result of a series of thermometrical experiments Somerville concludes that high frequency currents do produce a rise of temperature on the surface of the human body, varying according to the dosage, the locality chosen, and the method of application, and we cannot now wonder when patients tell us after treatment that they experience a pleasant sensation of warmth throughout the body. This rise of temperature is undoubtedly due to the action of high frequency currents on the vasomotor system, which, under the influence of the currents, permits of increased peripheral circulation. There must be a dilatation of the deeper vessels also. This doubtless explains why the blood pressure, as shown by the sphygmometer, is lowered. Afterwards, when the current is cut off and the surface temperature falls, the peripheral and deeper vessels regain their normal size, and as a consequence the blood pressure rises to its original height.

Hence, too, we may with greater confidence employ these currents when treating patients of advanced years, where perhaps the heart muscle is feeble. If we cannot directly stimulate the heart's action, we can at least lessen the resistance which it has to overcome while doing its work.

Again, with an increased peripheral circulation, there must be a withdrawal of blood from the brain and the organs of the abdomen. The circulation as a whole, therefore, must be aided, and more nourishment be conveyed with greater rapidity to the tissues. Hence more perfect metabolism occurs, and the individual is placed in better circumstances to oppose and to overcome the effects produced by the strain of daily life, and also by various diseases, such as influenza, which depress the functions of the body and lessen their activity. It need not surprise us, therefore, that in our experience we find men and women of all ages benefitting directly and indirectly by a course of high frequency treatment, and stating that they feel invigorated and refreshed. The treatment is painless and agreeable, and in no way interferes with the prosecution of daily duties.

Chronic Congestion Treated by Electricity. (*Florence A. Stoney, Archives of the Roentgen Ray, May,* 1906.) The power of electricity to cure varicose veins depends upon the time when the treatment is instituted. In the early stages a complete cure is possible, but if the patient resumes his previous manner of life, the same causes which produced the varicose veins may result in a recurrence. In the later stages when the valves are incompetent and the walls of the veins pouched and distended, electricity affords relief only. When an elastic support does not give relief the patient may be kept off the feet, with the feet raised, for several months, or electricity or massage may be employed or an operation advised. Electricity is suited to diffuse cases and those in which the patient is unable to give up daily work for two or three weeks for operation. In some cases ten treatments are sufficient to give complete relief, in other cases months of treatment are required.

The patient lies on a couch and a high frequency brush is played over the affected part, just avoiding large sparks. This is continued for five or ten minutes. The leg is then thoroughly massaged, this treatment being repeated twice a week. Laxatives, elastic bandages and systematic massage are valuable adjuvants to treatment.

High frequency currents have a much stronger action on the veins than other forms of electricity, and are not so unpleasant to the patient. Where an ulcer complicates the case progress is very slow; the pain disappears early and the patient thereupon stands upon the leg for long periods, thereby interfering with the progress of the case, but persistent massage and high frequency will cause the ulcer to slowly heal, leaving but little scar.

A Case of Double Tuberculous Orchitis Cured by High Frequency Effluvia. (*Dr. E. Bonnefont, Archives d'Electricite Medicale, May* 10, 1906.) Report of a case with fistulas in which a permanent cure was obtained with thirty-five treatments of from six to eight minutes each. The cure is maintained after two years.

On the Duration of the Lowering of Arterial Pressure After the Treatment of Permanent Hypertension by d'Arsonvalization. (*Dr. Moutier, Annales d'Electrobiologie et de Radiologie, April,* 1906.) Dr. Moutier's works on the treatment of hypo and hypertension are well known. It is possible with d'Arsonvalization to lower the arterial pressure of a patient who has hypertension below the normal point. The writer claims that such a lowering is permanent. In all patients where there was a subsequent raising of the pressure, another cause, such as a dietetic error or an inter-current affection, was always found.

Contribution to the Early Diagnosis of Tuberculosis. (*Gustavo O'Farrill, Annales d'Electrobiologie et de Radiologie, March,* 1906.) The author reviews first the classical elements of the diagnosis, and notes some differences applicable to Mexico. There residence at the seashore is presumptive evidence of tuberculosis; quickness of pulse and of respiration, and shortness of breath on muscular exertion have no value on account of the mountainous character of the land. Hemoptysis is very frequent on account of the low atmospheric pressure. Radioscopy may be useful : the most valuable diagnostic symptom it reveals is the diminution of pulmonary elasticity as shown by the lesser excursion of the diaphragm on the affected side. A good confirmation is given by high frequency effluvia. In all of the very numerous cases the writer has treated, he has always found the points where effluvation was painful to correspond to the points where radioscopy showed lesions. To explore this pathological tenderness, the clavicle and the scapula should be placed as much as possible out of the way, as bones are very sensitive to high frequency currents. This is obtained by lowering or elevating the shoulder as much as possible.

How Cerebral Anemia Modifies Epileptiform Crises Produced by Alternating Currents. (*J. L. Prevost and Mioni, Annales d'Electrobiologie et de Radiologie, April,* 1906.) Cerebral anemia inhibiting the activity of the motor cortex modifies the epileptiform attack caused by the application of an alternating current from the mouth to the nape of the neck. Said attack is then reduced to its convulsive tonic phase : the clonic phase is absent.

The attack thus modified by brain anemia may be compared to the epileptiform attack which, in dogs, follows the application of an alternating current from the head to the anus. The heart is paralyzed and the epileptiform crisis has only a tonic phase without subsequent clonic period.

RADIODIAGNOSIS

On the X-Ray Diagnosis of Kidney Stones. (*C. Thurston Holland, London Lancet, June* 2, 1906.) Holland advocates the use of the Albers-Schoenberg compressor tube apparatus in roentgenographing calculi of the kidney, as by its use the up-and-down movement of the kidney due to respiration is done away with. His own apparatus is described as follows : "It consists of a metal tube attached by a joint to an arm which can be fixed if so desired to the stand which supports the X-ray tube; to the upper surface of this tube is attached a metal shield with an opening for the insertion of different-sized diaphragms; the lower half of the tube is detachable and the upper part is so made that any size or shape of lower half can be rapidly fitted. For kidney examination I have had made specially curved lower portions so that the long side can be pressed well down into the abdomen whilst the short part fits over the lower ribs. Thus we can get plenty of pressure without the necessity of either tilting the tube or of causing the patient unnecessary pain and discomfort and the long side by its pressure into the abdomen helps to control the respiratory movements of the side under examination and so to fix the kidney. This latter is a most important point, as it was the up-and-down movement of the kidney with respiration which made the diagnosis uncertain when long exposures were given and which necessitated for success that the exposure should be made during the time the breath could be held, and as this rarely exceeds 30 seconds it was not always possible to obtain satisfactory penetration of the abdomen. The one obvious drawback is that to examine the whole stone area necessitates the use of five plates and five exposures, one upper and one lower abdominal on each side and one pelvic for the lower ends of the ureters. As, however, exposures very rarely have to be more than two minutes, and are often only from 60 to 90 seconds, this drawback is not so great as at first sight might appear to be the case."

He does not believe that the X-ray can always be relied upon for a negative diagnosis and summarizes his remarks upon the whole subject as follows : "When a stone or stones are present in such size as to produce symptoms suggesting the desirability of operation, if a careful and thorough examination is made such stone or stones can nearly always be shown by X-rays. And this would also apply to the presence of stone even if the symptoms alone were not sufficient to demand operation. 2. In most cases where shadows are shown the size, shape, and position can be relied upon in diagnosing them as from kidney or ureteral stones. In other cases when doubt may arise as to the cause of the shadows the experience of the examiner will often settle the matter and in some cases stereoscopic radiography, the use of ureteral bougies, etc., can be used as a help. 3. The negative diagnosis can be relied upon only when the whole region on both sides is carefully examined and when the plates are taken under the essential condition for successful examination and when they are of the necessary quality in showing sufficient differentiation of the soft structures in the kidney and ureteral regions. 4. There can be no justification for operation or prolonged medical treatment without an efficient X-ray examination being made."

The Mechanism of the Closure of the Bladder, as Shown by Radiography. (*Charles Leedham-Green and John Hall-Edwards, Archives of the Roentgen Ray, May,* 1906.) Finger has taught that the internal sphincter of the bladder is far too weak to withstand the pressure and prevent the escape of urine from a distended bladder, and that the work is done by the external prostatic sphincter and the compressor urethral muscle. It is believed that the bladder assumes a round shape when containing but little fluid, and as the distention increases, the pressure gradually dilates the internal sphincter and allows the fluid to enter the posterior portion of the urethra; thus a bladder neck is formed.

This view, while widely adopted, has been persistently opposed by Zeissl, Fubringer and others. They believe that no matter how distended the bladder may become, the internal vesical sphincter always sharply cuts it off from the prostatic urethra. By radiographing the bladder in various degrees of distention in the living human subject, the bladder being distended by a suspension of bismuth, it has been found by Green and Edwards that the outline of the bladder in all degrees of distention is oval, not pear-shaped, that the urethra is sharply cut off from the bladder, and that there is no suggestion of a bladder neck.

They believe, therefore, that the sphincter plays a much more important part than Finger believes, and that it is this muscle that closes the bladder whether it is distended or not.

A Case of an Unusual Dislocation (Symphysis of the Pubis) without Exterior Signs and Detected by Radiography. (*A. Imbert and H. Marqués.*) A miner was working lying on the left side at the bottom of a shaft when a very heavy and huge block of stone fell on him. He extricated himself, but was unable to get up. The first diagnosis was fracture of the ascending ramus of the left pubis. After three months there was no consolidation and radiography was resorted to, after the former diagnosis had been reaffirmed twice by two surgeons consulted separately. The results of radiography were a revelation; they showed a dislocation of the symphysis pubis, the right pubis having come in front of the left.

Spintermeter with a Ventril Tube Box. (*M. O. Rochefort, Annales d' Electrobiologie et de Radiologie, April,* 1906.) The spintermeter has a pointed rod at the pole connected with the anode of the Roentgen tube and a flat disk at the cathodal pole. The conductor from the positive pole of the transformer passes directly to the spintermeter. But the current from the negative pole has first to traverse this ventril tube. The latter is enclosed in a dark box outside of which is a small spintermeter parallel with the ventril tube for measuring the resistance of the latter. If this is greater than 10 mm. it is usually an indication for reducing the degree of vacuum in the ventril tube.

RADIOTHERAPY

Dangers and Contradictions of Radiotherapy in the Treatment of Epitheliomas of the Face. (*Dr. Leredde, Journal de Physiotherapie, May* 15, 1906.) The choice of a treatment for a given case of epithelioma of the face is necessarily eclectic. Of course, a purely surgical treatment may be completely successful, but that is not sufficient reason to declare, as a most famous surgeon has done recently, that the knife is the only possible method. On the other hand, specialists are too prone to extol radiotherapy as the only means of salvation. In many cases the physician is justified in choosing any method he prefers; in some cases, radiotherapy is distinctly superior, for instance, in cases of epithelioma of the eyelids or of the nose. But, on the other hand, radiotherapy may have its dangers. Four cases are reported in which X-rays seemed to effect a cure, but in which there was subsequent rapid and much more malignant recurrence or extensive involvement of the lymphatic system, quite an exceptional occurrence in cutaneous epithelioma. The writer considers it unwise when an epithelioma with a weak virulence can grow quietly upon the surface to provoke through the use of radiotherapy a superficial healing that impedes growth toward the surface and may consequently be followed by an increase in the virulence of the possibly remaining cancerous elements. This notion is most important to bear in mind. Radiotherapy must be rejected as dangerous when there is a lymphatic involvement, when the epithelioma grows quickly, when it is deeply situated and in all melanotic epitheliomas. In all of these cases roentgenization may favor an invasion of the lymphatic channels. Besides, the technic of radiotherapy in cancer, as well as the study of its indications, should be made more strict. Higher doses should be given, for instance, 12 H., instead of five, six, or eight, as is usually done, and two or three courses of treatment should be considered a minimum.

A Case of Neuralgia of the Trigeminal Nerve Successfully Treated by Radiotherapy. (*Dr. G. Haret, Archives of the Roentgen Ray, May,* 1906.) Haret's case was 33 years of age, suffering from painful crises occurring every five or ten minutes for several days at intervals of three or four weeks, the pain being situated in the upper maxillary region, and not relieved by chloral or morphine. After a year's suffering the zygomatic fossa was curetted but without relief, and in the following year an attempt was made to remove the gasserian ganglion, but the operation was only partially successful. It was, however, followed by several months of relief. After a time the pain recurred, and in 1902 an operation was performed on the mastoid apophysis. This was followed by relief of pain for several months, but after five months the patient's condition was as bad as ever. He would have ten or twelve attacks in twenty-four hours, was taking morphine to excess and was depressed to the point of contemplating suicide. He had had nearly all the teeth on the left side extracted.

The painful region was radiated through the mouth, the neighboring part being protected by a lead-glass tube. The X-rays were directed against the alveolar region of the first and second molars. A dose of four Holzknecht units of No. 7 Benoist rays was given daily. After the third treatment the patient experienced some relief; after the fourth treatment the pain completely ceased, and he has remained free from it for one year. Thus a few radiations were more successful than surgical intervention.

Roentgen Treatment and Roentgen Dermatitis. (*Leopold Freund, Archives of the Roentgen Ray, May,* 1906.) It has been proven that a vast number of severe maladies will react readily to Roentgen treatment. Especially the destructive action of the rays on pathological cells is marked. A specific action unattainable by any other agent is depilation. In favus this mode of treatment is to be preferred to all others. In tinea, a cure is obtainable in three months, whereas, formerly, two years were required. In sycosis, the results are rapid and excellent. Hypertrichosis may be removed if properly treated. Freund has treated 71 cases. In 22 cases, treated two years ago, there is no scarring or this sequel so slight, that the patients are completely satisfied. The production of a permanent epilation requires from 68 to 127 treatments, extending over a period of from one to two and one-fourth years. He has not obtained a cure with less than 68 six-minute treatments.

Especial care must be used in the treatment of hypertrichosis in young girls, as when they marry there may be a development of telangiectases during pregnancy. X-rays should be used only where the case is so extensive as to make electrolysis out of the question.

Freund has treated 67 cases of lupus vulgarus, 31 of which have been kept under observation. Seven of these remain absolutely well, five cases cured are not included, since they have been well but six months, four other cases have written that they are completely well, but are not included, since they were not examined. Three others remaining cured when treated, have developed lupus in other regions. In five cases there has been recurrence. In two cases only was the treatment unsuccessful.

Radiotherapy is superior to Finsen treatment in this disease, since it is more simple, less expensive, very much quicker, large areas can be treated and the tissues are penetrated to a greater depth than they are with the Finsen light. It has been proved that lupus can be completely cured by the Roentgen Ray, and a few reported failures do not disprove this.

If a surgical case dies of sepsis following operation we don't condemn the operation, but the operator. A single positive result counterbalances countless negative results. A faulty technic and a careless mode of procedure cannot be successful. Roentgen therapy has rendered good services in the treatment of carcinoma and sarcoma, also in caries of the small bones. In neuralgia and leukemia it is a most efficient agent and it may prove useful in cases of brain tumor.

In carcinoma of the tongue and roof of the mouth a prolongation of the patient's suffering is the only result which Freund has been able to obtain, and he has never yet observed a cure. In certain forms of trachoma success has been obtained by radiotherapy.

Radiotherapy must not be judged or condemned for isolated cases of accidental complication. Neither should the reaction required for the production of a cure be spoken of as a burn and radiotherapy designated an experiment.

Tumor of the Rectum Cured by Radiotherapy. (*Stephane Leduc, Archives d'Electricite Medicale, May* 10, 1906.) Inoperable cancer treated by X-rays; three to six minutes over perineum, two minutes over each iliac fossa, two minutes on the suprapubic region, the normal ray being always directed toward the tumor. Treatments given at intervals of from six to fifteen days, in order to always keep the skin slightly irritated. Cure after thirty-five treatments.

Baso-Cellular Parakerato de Epithelioma Cured by X-rays. (*Prof. Costa, Archives d'Electricite Medicale, May* 10, 1906.) Tumors on the head, in a man forty-four years old, cured after six months during which patient received every other day during a week five H., and then rested during two or three weeks, and so forth. The total absorption was 75 H. and that enormous quantity never caused the slightest trouble.

Notes on Radiotherapy. (*Drs. Cerne and Cauchion, Annales d' Electrobiologie et de Radiologie, April,* 1906.) The writers give a second instalment of the statistics of their service. The first was given about fifteen months ago. They point out the progress made in technique during that period. They discuss, without giving any conclusion, the question of short and frequent, or long and infrequent treatments. They have seen but very light cases of radiodermatitis. They have treated 25 patients in all. Apparently good results in a case of actinomycosis; good results in four cases of myelogenous leukæmia : in three cases of tuberculous lupus (out of five treated), not quite as good in a case of lupus erythematosus. Cure in three cases of superficial epitheliomas; doubtful or negative results in other cancers; poor in two cases of sarcoma.

X-rays and Genital Activity. (*Dr. Villemin, Journal de Physiotherapie, May* 15, 1906.) From the author's experiments on guinea-pigs, he concludes : That X-rays destroy the seminal epithelium, but spare the interstitial gland; animals are made sterile, but they retain sexual desires. This favors Ancel and Bouin's theory, namely that, in the testicle, the interstitial gland alone is endowed with a general action on the organism.

A New Chromoradiometer. (*H. Bordier, Archives d'Electricite Medicale, May* 25, 1906.) This article begins by a critical review of the qualitative and quantitative methods of measurement used so far in Roentgen ray work. Every one has its inconveniences. By the way, it is interesting to mention that Prof. Bordier has had Holzknecht's tablets analyzed by an expert chemist; the composition of those tablets has always been kept a secret by the inventor, 99.77 per cent is formed by potassium sulphate; the rest is probably potassium sulphite, but it might be also tri-tetra or pentathionate of potash, the chemical reactions of which are very similar to those of potassium sulphite; the uncertainty on that secondary point the author promises to remove in a near future. The two substances that form the tablet are conglomerated with copal varnish.

After summarizing the technic of all existing methods and explaining what are the weak points of each one of them, Dr. Bordier describes his own device, which he planned after having studied carefully the mechanism of the action of Roentgen rays on fluorescent salts. This action is only a dehydration and an exhausted salt may be regenerated by simply dissolving it and letting it crystallize. Barium platino-cyanide is the best salt because the most sensitive. Bordier's radiochromometer is based on the principle of the changes in the color of that salt included in collodion and placed on the tissues themselves or on the same plane, instead of at a certain distance as in Sabouraud and Noire's method. The tablets are 6. 5 mm. square and pasted on paper which is gummed on the reverse side.

Four fundamental shades have been established corresponding to the four principal reactions of radiotherapic treatment. No. 1 is very light yellow and slightly greenish; it is the tint which barium platino-cyanide placed on a normal skin takes when said skin has received the greatest amount of X-rays compatible with its integrity; it corresponds to Kienbock's "normal weak exposure." With that exposure, the hair falls after twenty days or so and grows again a score of days later; there is no inflammation of the skin and no erythema, unless too soft a tube has been used. In a word, this first degree is characterized by an increase in all pre-existing congestive phenomena. It is the dose to use in the treatment of alopecia, favus, or internal tumors, when we do not want to provoke radiodermatitis; treatments should be given not more than once a month, lest there should be accumulation of effect and radiodermatitis would appear.

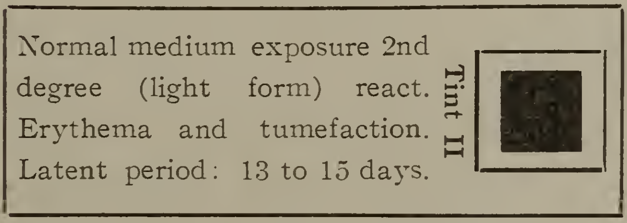
No. 2 is sulphur yellow; it is the tint platino-cyanide takes when exposed to a dose provoking on a healthy skin erythema, tumefaction, and a marked exfoliation after a latent period of from twelve to fifteen days; it corresponds to the average dose we must employ in the treatment of acne, lichen planus, and of certain forms of eczema and psoriasis. It may be used also for internal tumors, fibroids, goiters, carcinomas of the breast, if we do not fear the tumefaction and the desquamation of the skin, but we shall have to wait six weeks before giving another treatment. This dose is also the best for epilation, provided it be administered repeatedly.

No. 3 has the color of gamboge; it is the color of platino-cyanide when it has been exposed to a sufficient quantity of rays to produce a reaction in the second degree; that is, on a normal skin, redness, vesication and blisters with a serous exudate, *i. e.* true radiodermatitis. This dose must be reserved for the treatment of old lupi, of certain epitheliomas, angiomas or nævi; in one word, for all cases where we desire to induce a marked inflammation of diseased tissues.

Lastly, No. 4 is quite brown. It is the shade of platino-cyanide after an exposure to rays producing a third degree reaction, that is, necrosis and ulceration; this is the strongest exposure that has to be given in radiotherapy and never on a healthy integument; it will be reserved for the treatment in one sitting of certain forms of ulcerated epithelioma, or of warty epitheliomas of the face and the nose. All forms of cutaneous cancer called cancroid or ulcus rodens can be cured after one or two exposures which shall have produced No. 4 on platino-cyanide placed exactly in the plane of, and very near, the lesion. It is easy, when desired, to obtain intermediate shades corresponding to intermediate effects.

The standard shades have been prepared with products able to resist a long exposure to sunlight. Each one is strictly *invariable*, and thus obviates one of the principal drawbacks of Sabouraud's radiometer. Each shade is pasted on a paper square 15 x 15 mm. In order

Specimen of one of the 4 standard slips. The black square corresponds to the aperture in which the exposed platino-cyanide tablet is placed for comparison with the standard shade.



Normal medium exposure 2nd degree (light form) react. Erythema and tumefaction. Latent period: 13 to 15 days.

Tint II

to give the eye more sensibility to compare the standard shade with the tinge of the platino-cyanide, we have cut, in the center of the colored paper, a square aperture slightly larger than our reagent tablets (7 mm. instead of 6.5). Thus if we apply one of the standard slips on the exposed tablet, the latter appears through the aperture and comparison is very easy.

The writer's standards have been established for a rather hard tube; he calls attention to the abundance of ultra-violet rays emitted by too soft a tube (No. 2 Benoist, 2 ma., 2.5 cm. equivalent spark, for instance). Under such circumstances, a No. 2 exposure will be followed *next day* by an erythema which is not due to X-rays but to a *real electrical sunburn*; therefore the use of soft tubes is not advisable. But platino-cyanide tablets are not influenced by these actinic rays and show the same shade after the same time of exposure to very penetrating or to less penetrating rays.

And, lastly, precise measurements have demonstrated to Dr. Bordier that there is not only an individual susceptibility to Roentgen rays but also a regional susceptibility varying considerably from one part of the body of a given individual to another, not necessarily very distant from the first.

A New Unit for the Measurement of the Intensity of the Radiations of a Crookes tube. (*Dr. E. J. Durand, Archives d' Electricite Medicale, May* 25, 1906.) The writer has sought to determine a unit that could always be easily reproduced identical to itself and which would be independent of the substance employed. This he claims to have found in the following way: A photographic plate is exposed during a known time to the light of an electric lamp, of a known power and placed at a known distance. He takes for a unit of measurement in Roentgen work, the quantity of rays which, after acting on the same plate, gives a shade identical to that of the part of the plate exposed to the light of the electrical lamp. The author's experiments show a parallelism to exist between the actions of ordinary light and of Roentgen rays on photographic plates; this was not a matter of course, since everybody admits that those actions are of two essentially different natures. His note is only preliminary and a later article will give more precision to the method, which he claims is much more sensitive than any other.

MECHANOTHERAPY

The Treatment of Acute Otitis Media Purulenta and Mastoiditis, by Means of Artificially Induced Hyperaemia. (*Bier's Method*). (*S. J. Kopetzky, New York Medical Journal, June* 16, 1906.) After an historical review of this method of treatment from its introduction by Prof. Bier, the author cites and criticizes the published cases, and deduces from these histories the indications under which this new method of treating acute suppurating ears may be most advantageously undertaken. Earlier observers had not the benefit of prior publications upon which to base a line of indications, and from the study of all reports it became evident to the author that only when used in the early stages of the disease was the treatment a success and the necessity for mastoid surgery avoided.

The technique of the procedure is as follows: After the performance of paracentesis, the patients are put to bed and there is placed about the neck a rubber, slightly elastic bandage one to one half inches in width (children one-half inch) and sufficiently long to fit snugly. This is fastened at the ends with hook and eye. The pressure maintained must be sufficient to cause only a slight cyanosis of the face but not so tight that pain is felt in the congested region which should be warm to the touch. The regulation of this pressure must be learned by experience.

This bandage is kept in place twenty-two hours each day, and must be frequently inspected to prevent stretching, so as to maintain steady pressure.

The author observed no bad effects from the use of the bandage in any of his cases, but lays stress on the following contraindications, and remarks on the dangers which those to whom these contraindications apply would run were such subjected to the hyperæmic treatment.

The method is not to be employed among those having kidney lesions or heart troubles, and not on patients who give evidence of arteriosclerosis. Healthy and robust adults, and children, are those among whom the best results are to be expected.

Keeping in mind these indications and contraindications, the author employed the method on six cases, among which were two double involvements, *i. e.* on eight acutely diseased ears, and was successful in avoiding the mastoid operation in all but one case and that case had run for a little over two weeks before being brought under treatment. He calls attention to this case as further illustrative of the fact that only when used early is the method of advantage.

The detailed histories of each case are given and the author concludes his paper with the advancement of a theory upon which he bases the beneficial action of the induced hyperæmia. Briefly, it localizes the antibacterial fluids to the affected parts, producing an artificial œdema in the congested area whose tissues are saturated with body fluids giving a heightened bactericidal reaction.

Finally the author sounds a warning to the profession against the use of this method by others than experienced otologists, as the proper moment for operation may be missed, and the patient's life endangered by permitting the mastoid involvement to proceed unchecked for too long a time. Only " those who know the danger zone in time to avoid it " should undertake the use of this measure.

DIETOTHERAPY

The Dietetic Treatment of the Vomiting of Pregnancy. (*Louis Kolipinski, Washington, D. C., New York Medical Journal, June* 9, 1906.) For precision of diagnosis and propriety of treatment the vomiting of pregnancy should be considered pernicious whenever wasting of the body and weakness have become sufficiently great to prevent the patient from leaving her bed.

The vomiting is a reflex act, started by the ingesta or by motion, and the speed and ease with which everything is expelled are facilitated by its lightness and fluidity, by its physical characters of color, taste or smell. The tumultuous state of the stomach is aroused by the slightest impulse or emotion, as by the very thought of food. This hyperæsthesia of the organ is not due to any organic disease of its structure, and one cannot assume that the act of digestion is in itself retarded or arrested, but must recognize that the organ could perform its functions were it not for the state of acute unrest and excitability. Therefore the ingesta, if they excite emesis, arouse and perpetuate the vomiting.

These reflections led the writer to attempt a plan of diet with substances limited in number and of such physical structure, that, through their density and heaviness, ejection from the stomach was well nigh impossible.

Of proper foods, pork, ham or bacon, is first and best. The patient, who has been vomiting incessantly, will find to her intense astonishment that the emesis does not occur after a breakfast of fried ham or bacon, that partaking of other solids improves her condition, and that she is able to be up again. The cooperation of the patient is helpful, due to new confidence and the assurance that her malady can be controlled in a simple manner. Hopeful thoughts awaken the energy of her will, and dispel the hysterical state of passive submission.

Following the daily breakfast of pork in some form, with cocoa, chocolate, and corn bread, a dinner of beefsteak, roast or corned beef with rice, potatoes, spinach, cauliflower, kale, or turnips is offered. Fish, game, fowl, and cheese may also be suggested, and they help to make up the evening meal.

Foods which induce vomiting are water taken freely, milk, tea, coffee, soups, and all kinds of fluids, neutral, acid, and saccharine, custards, eggs, toast, and fruit. The most unstable combination of a diet is toast, eggs, and sweetened tea, things which the stomach of no gravid woman in the early months will tolerate. In the majority of instances it is, as is well known, perfectly safe to gratify the patient in her "longings," all the more so should they be for solid food.

To offer pork more than once a day is not objectionable, but it should at least be the first food taken each day until the cure is completed. The self selected regimen in one instance was boiled ham twice a day for more than two months.

This dietetic treatment hastens the progress of the case in its development or ending, excludes by success or failure the possibility of other diseases simulating this condition, or causing an error in diagnosis, and leaves the practitioner ample time to comprehend and treat the patient if a cure is not speedily obtained. On the other hand, liquid and unsystematized attempts at dieting add fuel to the trouble, and prolong and aggravate the difficulty.

General Convulsions in Early Infancy Induced by the Taking of Food,

and their Bearing upon Pyloric Obstruction in the Infant. (*Eustace Smith, London, The British Medical Journal, June* 9, 1906.) It is a familiar fact that in early life convulsions of reflex origin and often of little moment may arise from trifling irritation acting upon the periphery of nerves in various parts of the body. In infants the alimentary canal is the most common seat of this irritation, and a general convulsive seizure induced by the pain and irritation of teething or by a meal of indigestible food is a matter of common experience with every one. It has happened to me to meet at rare intervals with a case in which a healthy infant has been thrown into violent fits a few minutes after taking a meal of some simple food which an ordinary child, even the youngest, would digest with ease, and this without the seizure being preceded by vomiting, crying, or the slightest sign that the food did not completely agree.

A baby a few weeks old, the child of an experienced practitioner, since birth, although fed with judgment, had fallen into strong convulsions a few minutes after taking his bottle, and the fits had been repeated with the utmost regularity after each meal. He was a seemingly healthy and well-nourished infant, who looked comfortable and placid, and appeared to be in every way in a normal state. He was given about an ounce of Swiss milk and water—his usual food, which he sucked from his bottle with apparent enjoyment. He finished his meal, and the bottle was replaced upon the table. The child then closed his eyes and appeared to be sinking into a quiet sleep, when, in about two minutes he began all at once to twitch in the face, then to jerk his limbs in violent convulsions; his chest became filled, he ceased to breathe, his complexion turned darker and darker; then he stretched himself out with a slate-blue face, and lay quite still. An attempt was made to re-establish respiration, but without any success; the child was dead. The whole attack did not last longer than thirty seconds, if it lasted so long.

Four or five similar cases have been observed, but without the same tragic ending. With ordinary treatment, and some help to the digestion, the attacks have been brought quickly to a close. The patients have all been hand-fed babies, who have been healthy-looking, well-nourished and apparently strong. They have not been peevish or fretful, or sufferers from abdominal discomfort, or other sign of indigestion; but after each meal of the simplest food they have been thrown, without any warning, into strong convulsive fits.

These cases seem to throw a strong light upon the mechanism of pyloric obstruction in the newborn infant. Some hold that this contraction is a congenital lesion, that the infant comes into the world with a thickened and narrowed pylorus. Others look upon the contraction as due in the beginning to a reflex spasm of the pyloric wall, induced by the taking of food, and believe that the continued repetition of the contraction determines a hypertrophy of the muscular layers which encircle the opening. That the signs of obstruction are often absent at birth, and may not appear until an interval of some weeks has elapsed, is a strong argument in support of the latter view.

These cases also seem to furnish a

practically conclusive argument in favor of the convulsive theory. If such mild irritation as is caused by the mere presence of food in the stomach can induce general convulsions in an impressionable child, why should it not be able to set up a local spasm in the pylorus?

The tendency to local spasms in infants is a fact universally recognized. A common example is laryngismus stridulus. This may occur alone, or it may be complicated with general convulsions, or it may alternate with them. It is commonly the result of post-nasal irritation, which may also induce general convulsions. Either may occur without the other, although the irritant capable of exciting them is the same. There is, therefore, nothing unreasonable in believing that gastric irritation may set up general convulsions without pyloric spasm, or pyloric spasm without general convulsions, or both together.

Clean Milk. (*J. Roby, The Journal of the American Medical Association, May* 12, 1906.) Roby demonstrates from the experience of the Rochester health authorities that a remarkably clean milk can be secured without an expensive plant, and points out the way. The essentials are, first, the protection of the milk from any possible infection by disease, such as scarlet fever, diphtheria or typhoid. Second, cooling the milk and keeping it cold, or at least below 50 degrees. Third, keeping the utensils clean, or, better, sterile. Fourth, milking directly through sterile cheese cloth into a pail with a small (five-inch) opening. Fifth, keeping the milk tightly covered. These five points are absolutely necessary. Unless they are followed, milk with a low bacterial content can not be produced.

With the following also carried out the proportion can be still further reduced so that in well-equipped and managed dairies it can be kept at 1000 or below. Sixth, discarding the first-draws from every test. Seventh, keeping the cow absolutely clean. Eighth, keeping the milkmen's hands and clothes clean. Ninth, keeping the ceiling clean and free from dust; preferably it should be lathed and plastered. Tenth, keeping the barn clean and using shavings instead of straw for bedding. Eleventh, being careful not to stir up the dust before milking.

He suggests that cities have a municipal sterilizing plant where the cans and cloth strainers can be sterilized and thence, with everything in place ready for milking directly into the can, sent out into the farms. After they are filled, all the farmer would have to do would be to seal the can after removing the strainer, put it into an ice-water trough, and then send the whole outfit back to the city, where the milk can be bottled or delivered directly. This plan was tested, and bacteriologic examination showed a milk with less than 500 bacteria.

Meals Medicinal: with "Herbal Simples," (of Edible Parts). Curative Foods from the Cook; in place of Drugs from the Chemist. By W. T. Fernie, MD., the author of "Herbal Simples," "Animal Simples," "Kitchen Physic," etc., etc. Bristol: John Wright and Co. London: Simpkin, Marshall, Hamilton, Kent and Co., Ltd. 1905. Price nine shillings.

This is a volume of 781 pages, 39 of which are occupied by an "index of Diseases and Minor Ailments; with dishes and drinks (of medicinal parts), proper and sufficient for the curative treatment of each Malady." The various articles used as foods and beverages are arranged alphabetically, commencing with absinthe and ending with yeast. Reference to the various articles described is further facilitated by a table of contents, also arranged alphabetically.

The inspiration of the book is the assumption that (in lieu of drugs) an adequate sufficiency of component curative parts stands embodied in most of our ordinary dishes and drinks, if judiciously appointed and skilfully applied; and that it rests with the enlightened physician, and the well informed housewife, to make themselves practically acquainted with these principles for cure as possessed by foods and beverages, which can be specially prepared and prescribed for the several maladies as they come under management.

The descriptions contain some scientific information, considerable tradition, and many quotations in prose and verse. One would be disappointed who looked in the book to find a complete account of the latest scientific information concerning any particular article of diet, but he would not fail to find something of interest, and some suggestions of importance and value, as well as much curious information gleaned from writers of many different centuries.

The leading motive of the work is, in the words of the author, to instruct readers, whether medical or lay, how to choose meats and drinks, which can afford precisely the same remedial elements for effecting cures as medicinal drugs have hitherto been relied on to bring about; and which, plus their vital force, are of supreme advantage, because energetically derived straight from the fresh animal and vegetable sources. So that a culinary materia medica will stand out thus completely and agreeably provided, on which dependence can be placed, even with greater trust than on prescribed drugs.

Incorporated in the present volume are the main portions of one of Dr. Fernie's earlier books, "Herbal Simples," which has already passed through two editions.

This is not exactly the book to which the busy practitioner would turn when in a hurry to gain some definite scientific information for immediate use, but if he will take it with him and read it, while on his summer vacation, he will find in it much of interest, and his ideas in regard to food and beverages will be materially broadened.

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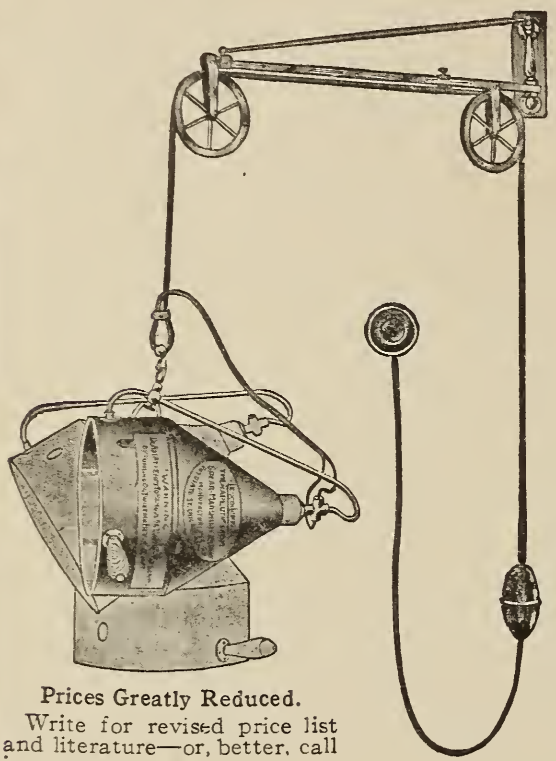

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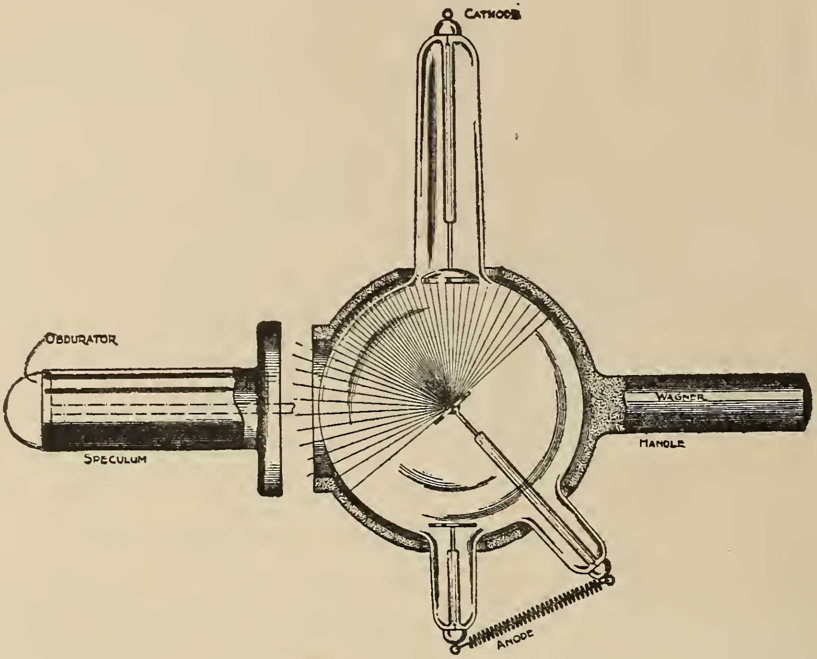

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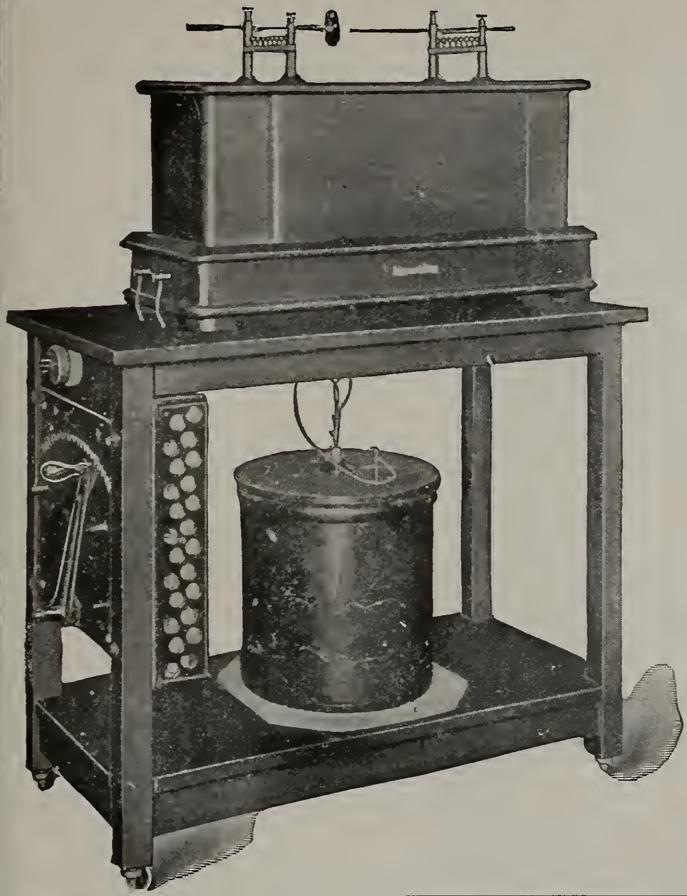

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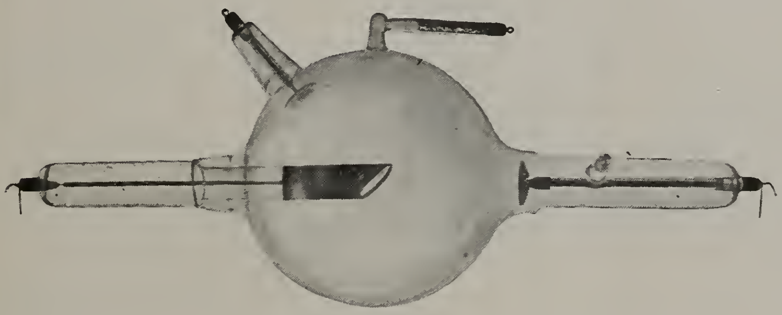

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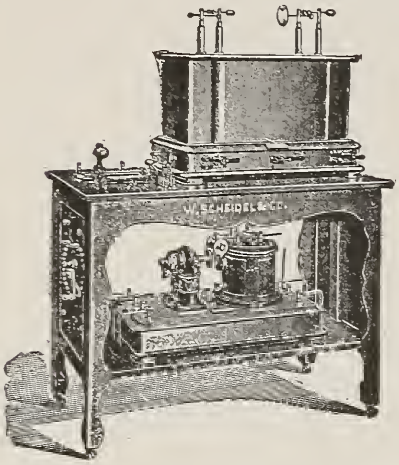

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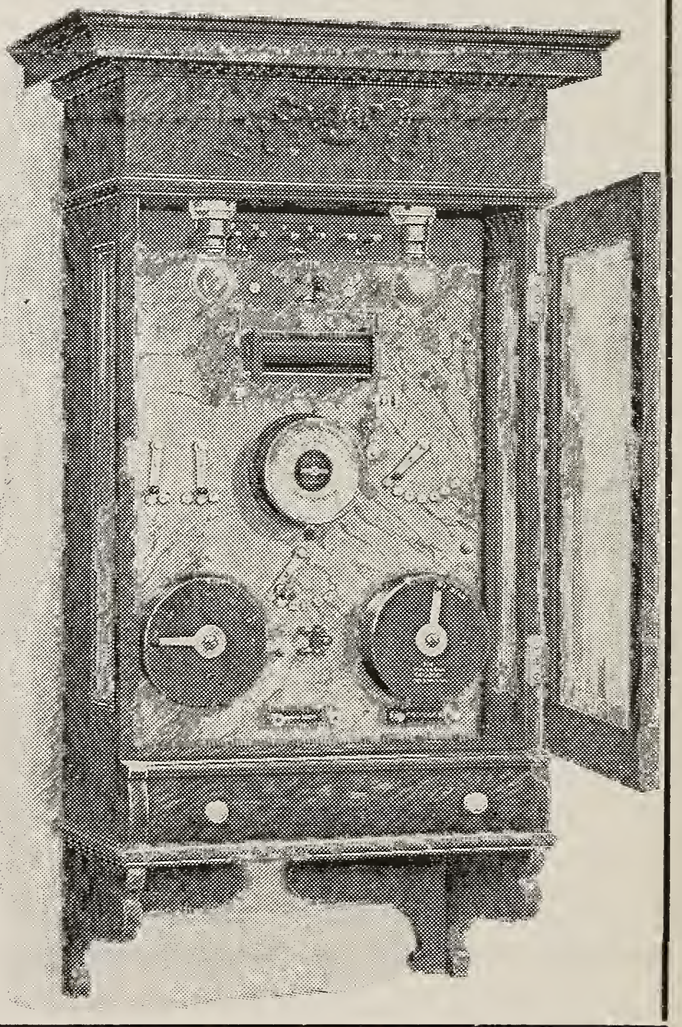

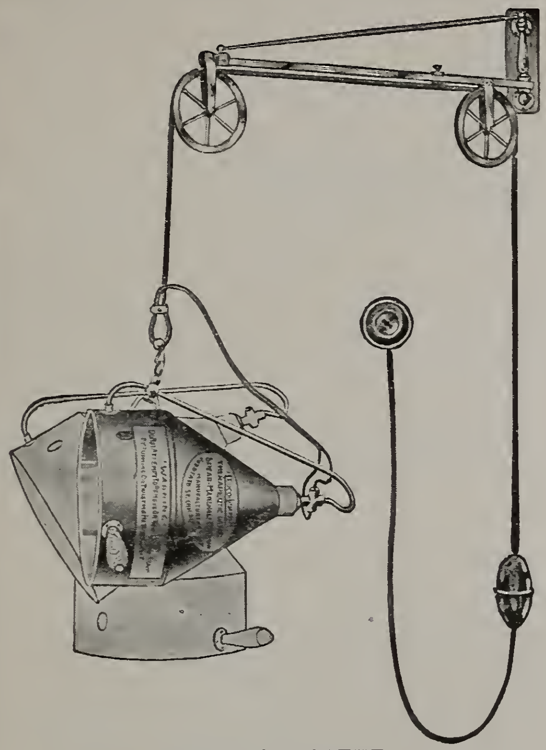

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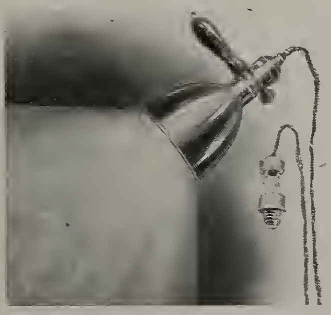

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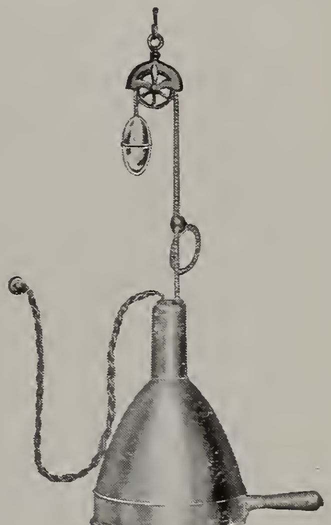

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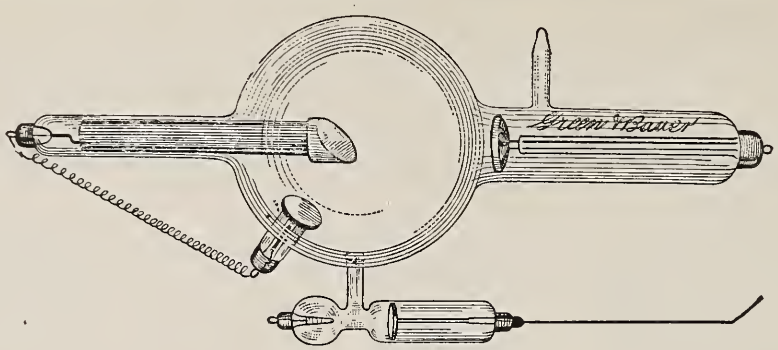

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VOLUME IV SEPTEMBER, 1906 NUMBER III

AN UNUSUAL CASE OF DEMENTIA PRÆCOX, ASSOCIATED WITH EPILEPSY, AND A MOST EXTENSIVE BROMIDE ERUPTION *

BY CURRAN POPE, M. D., OF LOUISVILLE, KY.

Professor of Physiological Therapeutics in the Kentucky School of Medicine, Physician to the Pope Sanatorium, Member of the American and Mississippi Valley Medical Associations, President of the Louisville Neurological Society, Vice-President of the Ohio Valley Medical Association, Vice-President of the Louisville Medical and Surgical Society, etc.

THIS case was seen by me, in consultation with Dr. Morris of this city, and seemed to me to be of such an unusual character, that I report same, not alone because of its interest, but also because of the simplicity of the measures used for promoting recovery.

The patient is a single man, aged twenty-seven, who has, up to this time, followed no occupation; he was born in Kentucky, of healthy parents, and his father at the age of fifty-eight, and mother at the age of fifty, have shown no neurotic or other tendencies. Four living brothers, one older and three younger, are in excellent health and good physical condition. The patient does not use and never has used alcohol or tobacco, and has never suffered from any of the infectious diseases, save measles. A specific history is denied. He is five feet, eight inches in height, weighs one hundred and forty pounds, and has had fair general health.

When a child of four years of age, he developed an attack of cerebro-spinal meningitis, and from that time on was never really considered to be mentally strong. About the time of adolescence, he began to exhibit a mawkish sentimentality with regard to himself and those around him, together with some mental excitement, and mild delusions of a religious or semi-religious type. About this time he had a tooth pulled, the shock of which seemed to depress and irritate his nervous system considerably, with the result that it was followed by a severe attack of genuine epilepsy in which the typical symptoms of the seizure were present, the patient biting his tongue in the convulsion

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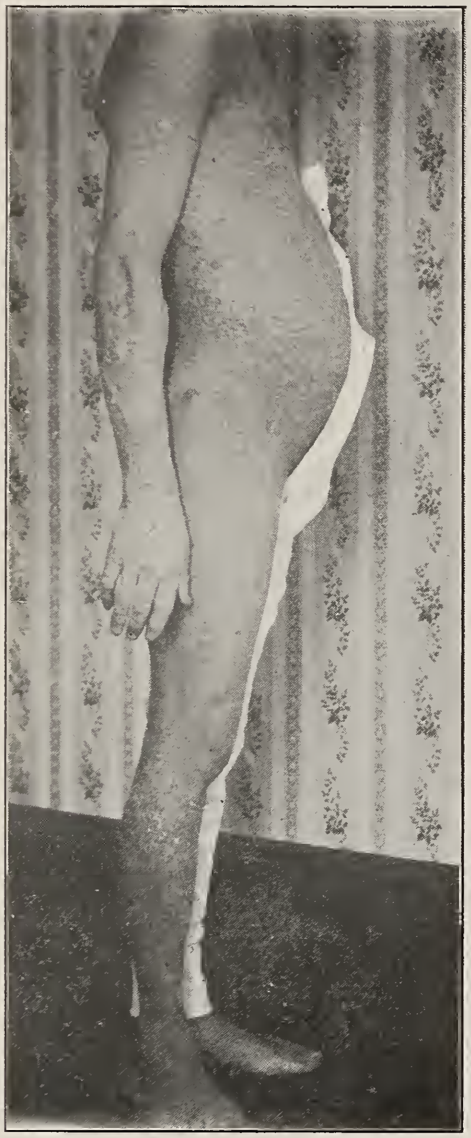
* Read before the Southwestern Kentucky Medical Society.



and passing urine. The mental condition, which seems to me was that of dementia praecox, continued about the same, though the epilepsy became much more violent and frequently the boy had from four to eight attacks *per diem*. From the commencement of the epilepsy, at about the age of sixteen, he had been subjected to constant and large doses of the bromides, which partially controlled the attacks.

Four years ago he suffered from a sudden exacerbation of the mental symptoms with delusions of a religious character, great motor excitement, and a tendency to destructiveness. This required restraint in a hospital adapted to such cases and he remained under the care of experts for twelve or fifteen months. At the end of this period, he returned home very much improved. One year ago another exacerbation compelled restraint, and he was again confined with much benefit and improvement, returning home about three or four months before he was seen by me.

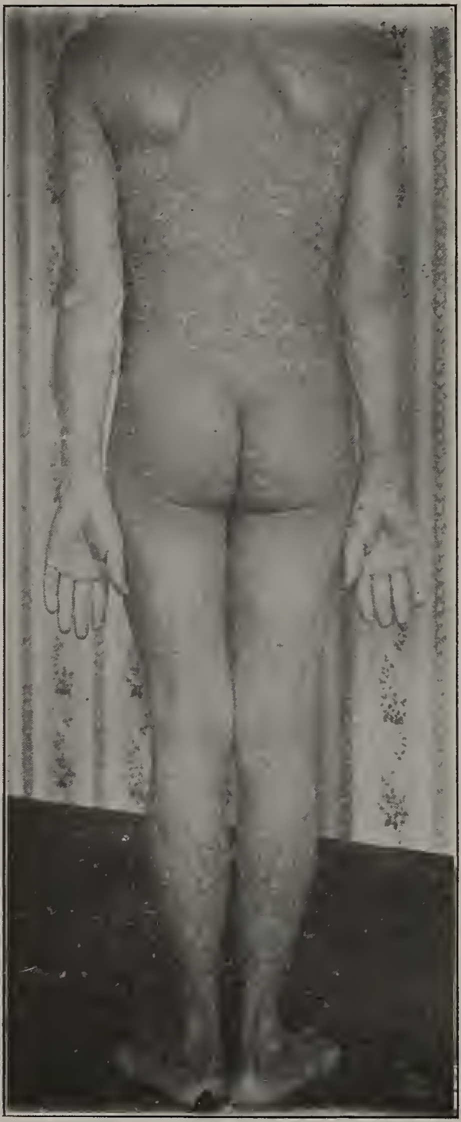
During his stay in the institution and up to one month prior to my visit, he was still subjected to large doses of the bromides, with the idea of controlling the epileptic attacks. When seen by me with Dr. Morris, we found him to be a fairly well-developed man, with quite a number of marks or stigmata of degeneration, especially noticeable in the palate and ears. The interesting feature of the case was an intensely nervous condition which led the parents to fear another mental attack, and which was further aggravated by the presence of a most extensive eruption of a scaly, ichthyoid, character, whitish-gray in color, which near the arms showed a red and raw surface exceedingly tender and painful to the touch. The rash was of the most irritating kind, and nearly drove the patient to destruction, because of the itching. He also complained of difficulty in digestion, his breath was disordered, tongue coated, flatulent conditions of the stomach and intestines were present, constipation marked. Insomnia was also present, little sleep being obtained on account of the itch. Vertigo, dull, heavy headache, faintness, weariness, and slight ataxia, vasomotor flushings, loss of memory, mental depression, increased emotions were among the many things complained of.

Physically, heart and lungs were normal, pulse 98, temperature 97.8 degrees F., respiration 22, arterial pressure 120, reflexes normal, sensation hyperesthetic, nutrition very poor.

The case was a most unpromising one, and we decided to institute simple treatment. To that end the patient was instructed to take — night and morning — upon getting up and retiring, a neutral bath at a temperature of 94 degrees F., of from a half to one hour's duration. He was then to be dried without friction and a simple unguent applied to keep down the scaliness. A tonic of the glycero-phosphates of lime and soda was given after meals for its nutritional effect.

As before stated the case is reported because of the immediate and almost instantaneous effect of the hydrotherapeutic method employed, for the neutral bath allayed the irritation and itching in twenty-four hours, and resulted in recovery within ten days. It will be noted at the same time, that the patient was given no bromides as we believed that the eruption was largely due to this, if not entirely so, and for that reason their use was interdicted. An interesting feature was the immediate diminution of epileptic seizures to a point of fifty per cent, and at the same time there obtained a marked lessening in the severity of the attacks.

His father has since informed me that the mental condition of the patient has been greatly improved and that, in his opinion, he is now in better health than he has been for a number of years.



The combination of dementia praecox and epilepsy is rare in the writer's experience and for that reason he believes the case is an unusual one. The cause is probably to be ascribed to those organic changes which have taken place in the meninges of the brain, and which would, of course, make the prognosis in this case grave as to recovery from the epilepsy or mental condition.

The patient's father, a man of unusual intelligence and breadth of mind, realizes fully his child's condition and has of late only endeavored to ameliorate his condition. I only desire to say in passing, that it is my firm conviction that we could lessen the attacks of epileptics, and, if taken early enough, before the habit becomes confirmed, cure many cases of this disease, would we, as a profession, study more intelligently the causal conditions, the removal of which would aid in lightening the burden of the overtaxed central nervous system. After sixteen years of active experience in the treatment of epilepsy, I feel warranted in saying that in no domain of therapeutics is there a greater hope held out to the epileptic than in hydrotherapy. It has, in my hands, done more to cure these unfortunate individuals than any other one method; and I am firmly of the opinion that the only benefit this case derived was from a hydrotherapeutic procedure, the simplicity and ease of application of which places it within the reach of all.

Dementia praecox is a disease the pathology of which is unknown — possibly congenital — but in this case due, in my opinion, to the previous meningitis. Its prognosis is unfavorable, a small percentage of the cases getting well, and others having remissions, but the majority passing into a state of dementia and there remaining until carried off by some intercurrent diseases.

A CASE OF FROZEN FEET TREATED BY THERMÆROTHERAPY

BY FRANCIS S. SKIFF, M. D., OF FALLS VILLAGE, CONNECTICUT

ON February 8th, 1906, I was called to attend Mr. F., aged thirty years, who had frozen his feet two days before. It might be well to state that he had also frozen his feet slightly in the previous December. All the toes of both feet were lifeless, and there was little sensation in half of each foot when pricked with a needle.

The treatment for the first three days consisted of hot bichloride packs, 1-1000, but I then decided that local dry hot air applications would better meet the indications and be a scientific method of treatment. I therefore had my patient place his feet in the apparatus at a temperature of 140-150 degrees F., three or four times a day for from an hour to an hour and a half each time, during a period of two weeks.

After two treatments the patient stated that each time it made them feel better. With continued use the circulation improved and sensation was gradually restored. Great layers of skin desquamated from both feet and toes. The feet were ultimately saved with the exception of a part of the two great toes and the second toe which, becoming gangrenous and the line of demarcation having formed, were amputated, the right great toe at the first metatarsal articulation, left great toe at the second metatarsal articulation, and the second toe at the third articulation. The after-treatment consisted of antiseptic dressings and irrigations with lysol or carbolic acid solution.

There is no doubt in my mind or in that of the grateful patient, that the use of the dry hot air applications saved his feet.

HIGH FREQUENCY CURRENTS IN THE TREATMENT OF SMALL BENIGN NEOPLASMS AND HYPERTROPHIES OF THE SKIN

BY JOHN T. RANKIN, M. D., OF LOS ANGELES, CALIFORNIA

The modification and obliteration of the various hypertrophies and benign neoplasms of the cutaneous structures, is a subject of more or less interest to most physicians, as our advice is frequently sought regarding the removal of some unsightly blemish from an exposed portion of the body. It is of primary importance that the results of our treatment should constitute a cosmetic improvement upon the original condition. The mere removal of a new growth or hypertrophy does not mean that the treatment has been successful, as, from a cosmetic standpoint, it may be a conspicuous failure. The replacing of a chloasmatic spot by a shining area of scar tissue, would certainly not be considered a cosmetic improvement with some complexions as a background, and the substitution of a depression for a projection would not be graciously received by many of our patrons, since in doing this we may have substituted an incurable blemish for one which might have been satisfactorily removed.

The measures used in the treatment of these affections are tissue-destroying agents, which are applied directly to the site which it is desired to destroy. An exception to this mode of treatment might be made when variously colored pigmented areas arise as a result of constitutional disorders; in such cases appropriate internal medication would be the most rational course.

The local methods used for the purpose stated, include excision, scarification, the application of caustics, the galvano or thermocautery and electrolysis. The Roentgen, ultra-violet and radium rays have also been used in this work, but it is concerning the use of a contemporary measure of these latter agents, that I wish to speak, namely, electrical currents of high frequency.

A number of reports have been made respecting the employment of this form of electricity in the treatment of the conditions referred to in the title, and also malignant neoplasms and various skin lesions such as lupus, acne, etc. The majority of writers, however, prefer to use the high frequency current as an auxiliary to the Roentgen or Finsen rays when treating these latter affections. But when it comes to the small localized hypertrophies and benign neoplasms of small size we have a field which the high frequency currents will occupy with considerable credit, perhaps not to the extent of supplanting the older methods, but at any rate to greatly encroach upon the fields of their former activities.

We have used the high frequency currents in a good many cases for the removal of warts, freckles, pigmentary and vascular nevi, and in the great majority of cases very satisfactory results have been obtained. The most pleasing feature about the use of this modality has been the character of the resultant scar, which, without exception, in any case thus far treated, has been either imperceptible unless closely examined, or at the worst, has left only a pinkish scar of soft texture. In some of our patients with pale skins this reddish spot did constitute an objection, and there was often a colored areole surrounding the site of the treated area. This discoloration persisted in some instances for several months but finally disappeared.

Of course such a condition is apt to be produced in a patient with a fair skin, no matter what agent be used in treatment, so that one should use special care in these cases not to produce too great a reaction.

The electrical current which we have used in this work is derived from the Oudin type of resonator, energized by an induction coil carrying from one and three quarters to three amperes through the primary, and interrupted by a mercury jet break. The electrode used was the ordinary needle holder for electrolysis, inserting in place of the needle a piece of pointed copper wire; these wire points may be of different sizes and either very sharp or blunt according to the character of the spark desired. The electrode must be specially insulated with heavy hard rubber tubing. The current passes by one wire from the extremity of the resonator drum, the monopolar method.

The site of application and the area surrounding, should be rendered aseptic, and all recognized precautions should be taken to prevent the entrance of septic organisms into the wounded tissue. In applying the spark, we have the patient recline on the operating table as he is more under control in this position than while sitting. It will seldom be found necessary to use an anesthetic, as, in the majority of cases the high frequency spark produces more or less anesthesia after a few moments application. The point to be treated is lightly pressed between the thumb and finger of the operator's left hand which reduces the sensibility of the part thus lessening the pain; the right hand, holding the electrode, brings its point within a few lines of the site of attack. A mild current producing a small spark is then passed through the apparatus, and after a few seconds a stronger current may be used and the point of the electrode gradually withdrawn from the surface until a spark varying from one to two centimeters in length is secured. This, of course, must be regulated by the toleration of the patient and the amount and rapidity of tissue destruction desired.

The first action of the spark is to cause a contraction of the blood vessels, and an anemic condition ensues. This is quickly followed by a dilatation of the vessels and a consequent reddening of the area affected. When the part treated is vascular, an oozing of yellowish or reddish brown serum takes place. Soft nonvascular warts become quickly blackened and shriveled, and there may be little or no oozing.

The time of each individual treatment and the number of treatments necessary to secure the desired result, cannot be stated, as, obviously, these factors must depend upon the degree to which the destructive action is carried, and the length to which this latter should go can only be determined by experience. This may be readily gained by any physician who possesses the necessary apparatus for producing the true high frequency current. The beginner, to be on the safe side, should use a current of moderate intensity even though it may be necessary to repeat the application a number of times.

A marked difference will be found regarding the manner in which patients receive the treatment. To some it seems quite painful, the sparks have to be applied lightly and the seances made of short duration. This necessitates a number of applications which may be given at daily intervals. The majority, however, seem to experience but a comparatively small amount of pain or else exhibit considerable fortitude, so that small warts or moles may be destroyed by one or two applications.

The wound should be covered by a protective dressing. This is often objected to by patients when the applications are made to the face and cover only a small area. In such cases it may seem best to omit the dressing but special caution should be urged to prevent any contact with the wound; it should be protected during the night by oiled silk covered with sterile gauze and held in place by adhesive strips.

In treating vascular nevi measuring from two to four centimeters in diameter one-fourth or one-half the area may be treated at the first seance, leaving the balance for future daily instalments of sparks. A heavy yellowish or brownish scab forms over the part which the spark has bombarded, this scab falling off in from six to ten days. In cases where the nevus is of a deep port wine color, roughened and elevated above the surrounding integument, it will be found when the scab is removed, that the site of the blemish is smooth and on a level with the surrounding skin; the color will be decidedly lighter, more of a pinkish hue, and in every way the improvement marked. A second and even a third application may be required in these larger vascular blemishes, and even this should not be expected to entirely eradicate the mark; its appearance, however, is so modified, even after the first application, that the patient will be pleased with the change. The smaller marks ranging up to one and one-half centimeters in diameter, may often be entirely destroyed in from one to three treatments.

In treating lentigo and chloasma, use a fine, short spark and apply until there is a faint shriveling of the skin and a slight oozing over the pigmented area, using particular care not to carry the process too far in anemic patients. Soft warty growths may be treated until they turn brownish or brownish black in color, one application being generally sufficient in these growths. The firmer warty growths require more vigorous sparking, and often need treatment several days in succession. The action of the spark upon hairy nevi does not extend deep enough to destroy the hair follicle, so that the needle is frequently required to complete the obliteration; and this would perhaps better be used in the first instance as it often results in total destruction of the blemish.

It is possible that the high frequency current will prove useful in the treatment of small scars. Its action here was noted while treating a port wine mark involving the forehead and the temple. A physician had previously attempted to remove the nevus by the use of an acid, a small amount of the acid being applied along one edge of the nevus as a test; an objectionable scar resulted and the use of the acid was abandoned. While treating the nevus the spark was applied to the scar with the same intensity as that used over the nevus and when the resultant scab came off the scar showed a lessening of its former glistening white appearance. A second application was made and after this, when healing was completed, the white scar was completely obliterated. The least pressure over the area would drive the blood out and for a moment the glistening white appearance would prevail, showing that there had been but little destruction of the scar tissue but rather an extension of capillaries through or over the scar. In a person of a ruddy complexion it would seem preferable to substitute such a light, pinkish blemish for one that was glistening white.

Care should be taken not to use too heavy a spark around the eyelids, or over large superficial veins as this may cause considerable swelling of the tissues.

EDITORIAL

DETERMINATION OF ROENTGEN RAY VOLUME

THAT the need of a reliable and accurate apparatus for measuring Roentgen ray volume is being urgently felt and that the present devices are unsatisfactory and inaccurate, is demonstrated by the large number of articles which have recently appeared upon this subject, and abstracts of which will be found in the Department of Radiotherapy in this current issue of **The Archives.** The subject is so exhaustively discussed in these abstracts that we do not feel that we can add anything of value in this place, but it is most sincerely to be hoped that the agitation now in progress will result in the production of a practical and reliable instrument for this purpose.

ELECTROTHERAPY

Electrical Treatment of Anal Fistula. (*Dr. Billinkin, Bulletin Officiel de la Societe Francaise d'Electrotherapie, June,* 1906.) For eight years, Billikin has used electrolysis in the treatment of anal fissures, but generally without noticeable results. He thinks two elements are very important to consider, namely the nature and the diameter of the electrode. Copper and carbon electrodes should be avoided. Zinc should be given the preference. The smaller the diameter of the electrode, the better. Since he has taken these two facts into consideration, he has met with successes in two non-tuberculous cases while before he had only failures to report.

F. E. G.

Action of Hydro-Electrical Baths in Various Cardiovascular Affections. (*Drs. Albert-Weil and Mougeot, Journal de Physiotherapie, June* 15, 1906.) Second note describing the action of sinusoidal currents. The technic was that described last month with triple-phased currents. Hydro-electrical baths with sinusoidal currents always noticeably increase arterial pressure and seem to determine at the same time a peripheral vaso-constriction. Therefore they may be useful in the treatment of hypotension *sine materia*, but it is necessary to watch the volume of the pulse very closely.

F. E. G.

Clinical Studies on the Polar Effects of Faradic Currents and of Condenser Discharges. (*Dr. Richard Sudnik, Annales d'Electrobiologie et de Radiologie, April,* 1904.) The author contends that the poles of a faradic current are different in their effects, but as the intensity increases, the difference between said poles decreases, without ever being reduced to *nil.* Same thing happens when the application is prolonged. From clinical cases, he concludes that affections which do not involve directly the motor neurons can give rise to an inversion of the normal reaction, said inversion being total or partial. These modifications indicate a nutritive trouble and are characteristic of a sluggish nutrition.

F. E. G.

On the Treatment of Hydrarthrosis. (*Dr. Laquerriere, Bulletin Officiel de la Societe Francaise d'Electrotherapie, June,* 1906.) In recent cases the indications are: (*a*) relieve the pain by faradization from a coil with fine wire; (*b*) make the exudate disappear, which can be done by the use of different electrical modalities; (*c*) prevent muscular atrophy by exercise associated with coarse wire faradization; (*d*) avoid everything that could increase muscular atrophy, particularly compression.

In old cases, same treatment for the exudate and pain, but, above all, strive to restore the volume and the normal tonicity of muscles. An hydrarthrosis cannot be considered as cured before the latter point has been won.

F. E. G.

Movable Music-Stand Shaped Switch Board for Electrotherapy. (*H. Guilleminot, Archives d'Electricite Medicale, June* 25, 1906.) Description of an electrical table meeting the following requirements: It is light and movable; it is very simple, one switch being sufficient to give any form of current, and a single move being enough to pass from one modality to another; it is very convenient, all the regulating, distributing and measuring devices being under the hand of the operator; and last, it gives all forms of current with a single source. This apparatus is constructed by Radiguet and Massiot.

F. E. G.

A Medical Rheostat. (*Dr. Allaire, Annales d'Electrobiologie et de Radiologie, April,* 1904.) This apparatus has been in use during the past six years in one of the Nantes hospitals. It is very simple, has worked very satisfactorily and never needs repairing. The positive electrode is gas carbon such as those used for arc lamps; the negative is an aluminum sheet rolled in the shape of a cylinder, the center of which is occupied by the vertical carbon. There must be a sufficient distance between the carbon and the aluminum. Both are placed in a glass jar in which distilled water is poured till they are covered.

The principle of the method resorted to in order to increase the resistance consists in dividing with an insulating substance the liquid mass through which the current passes from one electrode to the other. This is realized by the use of three glass tubes fitting exactly into one another; one is attached to the insulating substance which forms the bottom of the jar; it is about three or four centimeters high and ground on one side so as to have its superior edge V-shaped. Between that tube and the carbon rod remains a space just large enough to let another glass tube slide in. At the superior part of the apparatus are two other tubes placed concentrically one inside the other around the carbon electrode.

In their upper third, these tubes are united by a substance both insulating and impervious to gases. The lower two-thirds is separated by a space filled with air and in this space the first above-mentioned tube will adjust itself when the two upper tubes are pushed down. When the three tubes are thus in tight contact, no current passes. The V grinding of the lower tube prevents the sudden increase in the intensity that would take place but for it, as the glass tubes would uncover the carbon electrode suddenly. The only care required by this rheostat is the pouring in of a little distilled water from time to time.

F. E. G.

Two Splinters of Steel Removed from the Interior of the Eye, with the Magnet. (*William R. Murray, Journal of the Minnesota State Medical Association and the Northwestern Lancet, July* 1, 1906.) Although the removal of pieces of iron or steel from the eye by the electro-magnet has now become so common as to arouse no particular interest yet Murray believes that the report of the case following, in which two separate pieces of steel entered the eye at the same time, apparently through the same wound, when only one piece was supposed to be present, is worthy of publication as indicating the necessity of exercising extreme care when searching for foreign bodies in this situation.

The patient was a blacksmith twenty-nine years of age who sustained the injury in October, 1905, while removing a shoe from a horse, a piece of steel striking the right eye. "The patient did not experience much pain at the time of the accident, and continued with his work until night. Two days later he consulted Dr. J. F. Pratt, who found a penetrating injury of the right eye, the wound of entrance being in the upper nasal quadrant of the cornea. There was an iritis present, the patient at that time complaining of considerable pain. The case was referred to me for the removal of the foreign body with the electro-magnet.

" Examination of the eye showed a wound of entrance in the upper nasal portion of the cornea, and immediately back of it a bulging of the iris, as though a foreign body were embedded in the iris tissue. The point of the giant magnet was applied at the site of the corneal wound and directly over the foreign body, but I was unable to draw it out of the iris tissue. After 'making' and 'breaking' the current a number of times, a small splinter of steel appeared at the corneal wound and attached itself to the magnet point, and was removed. Believing that there still remained a piece of metal in the iris tissue, and being unable to dislodge it by applying the magnet point to the corneal surface, I made an incision at the upper corneoscleral margin and passed the tip of a hand magnet into the anterior chamber, and by bringing it into contact with the steel I was able to free the foreign body from the iris tissue and remove it through the corneal incision."

The wound healed quickly and two weeks later the patient returned to work with a 20-30 vision with a correcting lens. Murray also desires to call attention, in connection with this case, to the fact that a foreign body may be so firmly embedded in the tissues of the anterior segment of the eye that it cannot be dislodged with the giant magnet when this instrument is applied to the surface of the eyeball, and that the hand magnet may thus exhibit advantages over the giant magnet by rendering possible the introduction of the tip of the instrument within the eyeball, whereby it is brought directly in contact with the foreign body, which may then be freed from its attachments and extracted with the least possible amount of injury to the organ.

RADIODIAGNOSIS

On the Necessity of a Uniform Technic in Radiography. (*Dr. Contremoulins, Annales d'Electrobiologie et de Radiologie, April,* 1904.) During the past eight years, the writer has tried on several occasions to have a definite and uniform technic adopted by all radiologists, so that the reading and the interpretation of any radiograph might be made mathematically. He has met, strange enough to say, with considerable opposition from many authoritative voices. His article is a forceful plea for the reform he has been advocating so long, based on practical arguments and also on mathematical demonstrations.

He has adopted a fixed distance of 30 inches between the anticathode and the sensitive plate in cases of stereoradiography and metroradiography (radiographic measurements) for foreign bodies. The normal incidence should be inscribed on every radiograph. The geometrical theory of the reading of plates is presented at full length, the phenomenon of inversion is explained, and a few common errors are rectified.

F. E. G.

On the Early Diagnosis of Chronic Pulmonary Tuberculosis by the Orthodiagraph. (*Leon Vannier, New England Medical Gazette, June,* 1906.) The author begins his article with the sweeping statement that "Radiographic work is out of the question here." He uses Dr. Guilleminot's orthodiagraph and presents the following facts:

1. The normal height of the diaphragm differs according to the side examined. The right side is higher than the left by 1.9 cm. on an average. Given a horizontal line passing through the upper border of the interclavicular notch, on the right side the diaphragm is distant 15.5 cm. from that line; on the left side 18.4 cm.

2. The distance the diaphragm

traveled measured, on both sides, the same, 1.63 cm.

3. Any appreciable difference from that average figure would denote a notable alteration in the pulmonary elasticity. A diminution of movement of one side of the diaphragm during inspiration is a sign of the greatest value, which may precede all the others, even the appearance of the opaque zone at the apex.

In addition to the observations made upon the lungs the author urges the importance of measuring the size of the heart, as recommended by Bouchard and Balthazard in 1902. These authors found that tubercular cases could be placed in two groups with regard to the heart:

1. Small heart in those predisposed to tuberculosis.

2. Large heart in advanced tuberculosis (cavity stage) with cardiac dilatation from pulmonary sclerosis.

G. E. P.

On The Roentgen Diagnosis of Primary Carcinoma of the Lung. (*Dr. M. Otten, Fortschritte auf dem Gebiete der Roentgenstrahlen, May* 29, 1906.) Dr. Otten calls attention to the fact that primary carcinoma of the lung is rare, that usually it is only diagnosed at the autopsy, and that text-books say very little upon the subject. He has collected 21 cases that have been followed to autopsy. All were observed during the past four years. He remarks upon the fact that while of the eight cases that came to autopsy during the first two years only two were examined with the Roentgen ray, during the last two years 13 cases came to autopsy and only two were not examined by the Roentgen rays.

When the disease involves the apex of the lung it is very difficult to differentiate it from tuberculosis of the lungs, but when the tumor develops in the region of the large bronchial tubes as is most common, the rays are of great assistance. Here secondary mediastinal tumors must be differentiated as well as aneurisms. The physical signs must be considered in connection with the roentgenogram to make a proper diagnosis.

G. E. P.

On the X-ray Shadows of Cystic and Xanthic Oxide Calculi. (*Henry Morris, London Lancet, July* 26, 1906.) The statement that calculi consisting of the above-mentioned substances give no shadow with Roentgen rays caused Morris to secure samples of calculi so constituted, from the Museum of the Royal College of Surgeons of England, have them analyzed chemically, and skiagraphed. He found that both varieties of calculi give distinct shadows even though the admixture of other salts was as low as 0.4 per cent. As most cystic and xanthic oxide calculi, however, contain considerable proportions of phosphates of lime, magnesium, ammonium and also sulphur, the last mentioned sometimes to the extent of 25 per cent, the contention that the Roentgen ray is useless as a diagnostic agent in this situation falls at once to the ground.

Supernumerary Teeth and Roentgen Rays. (*Dr. S. Dunogier, Archives d'Electricite Medicale, June* 25, 1906.) X-rays allow a correct diagnosis of supernumerary teeth to be made when the latter appear before the permanent teeth of the same region. They enable us to differentiate said supernumerary teeth from normal teeth developing irregularly either in shape or in direction. They show us the permanent teeth in the maxillary bones and give us all desirable information as to their shape, direction and distance from the gingival border. If used at regular intervals, they show us if the supernumerary teeth are an obstacle to the development of the permanent teeth and enable us to choose the best moment for active interference.

F. E. G.

Concerning the Variation in the Results of Orthodiagraphy and Percussion of the Heart. (*Dr. Gillet, Fortschritte auf dem Gebiete der Roentgenstrahlen, May* 29, 1906.) Dr. Gillet calls attention to the fact that orthodiagraphy only measures the breadth of the heart while percussion gives some idea of the mass.

G. E. P.

Concerning Sources of Error by the Orthodiagraph. (*Dr. Gillet, Fortschritte auf dem Gebiete der Roentgenstrahlen, May* 29, 1906.) Dr. Gillet calls attention to the error produced by the divergence of the rays after they pass through the narrow diaphragm, and says that this slit in the lead plates should be as narrow as possible, which would reduce the error to a minimum. The orthodiagram depends much upon the experience and accuracy of the operator.

G. E. P.

A Modification of the Stereopticon Method of Locating Foreign Bodies. (*Dr. Gillet, Fortschritte auf dem Gebiete der Roentgenstrahlen, May* 29, 1906.) Dr. Gillet has designed a very simple device for determining the position of a foreign body after stereoscopic plates have been made. Either tracings or the negatives are placed in a small frame; the eyes are then fixed and a sight is moved between the eyes and the shadows of the foreign bodies until one shadow is in line with each eye. This point is then fixed and measured.

G. E. P.

A New Method of Orthophotography. (*Dr. Albers-Schonberg, Fortschritte auf dem Gebiete der Roentgenstrahlen, May* 29, 1906.) Dr. Albers-Schönberg's new method of orthophotography consists primarily in moving the patient past a very narrow diaphragm. The apparatus used for this purpose consists of a lead chest containing the tube. The rays pass through a very narrow but long diaphragm so that only a space one centimeter broad is affected upon the plate which is about eighteen inches away. The patient is placed upon a chair which rolls upon a track away from the tube, swings upon a pivot, and is mechanically movable sideways by means of a crank, and thus the patient and the plate are gradually carried past the stream of parallel rays. Thus the exact width of the heart is photographed upon the plate. This method eliminates the personal factor which plays an important part in orthodiagraphy, and which gives considerable chance for error.

G. E. P.

A New Apparatus for Orthophotography in the Horizontal Position. (*Dr. Fedor Haenish, Fortschritte auf dem Gebiete der Roentgenstrahlen, May* 29, 1906.) Dr. Haenish accomplishes the same result as that described by Dr. Albers-Schönberg by placing the patient upon a table and moving the top of the table sidewise by means of a crank in a similar way in which the chair is moved sideways.

G. E. P.

A New Diaphragm Protecting Case. (*Dr. Peters, Fortschritte auf dem Gebiete der Roentgenstrahlen, May* 29, 1906.) Dr. Peters describes a diaphragm protecting chest which consists primarily of a box lined with lead and open on one side, and one side controlled by an iris diaphragm. This is mounted upon a heavy stand between two prongs of a fork, and in such a way that it can be rotated upon its axis.

G. E. P.

RADIOTHERAPY

A Case of Epithelioma of the Tongue with Secondary Growths in the Glands of the Neck and the Liver Treated by X-rays. With Histological Changes in the Primary and Secondary Growths. (*Robert Knox, London Lancet, June* 23, 1906.) This case of carcinoma of the tongue is interesting as it shows the apparent arrest of the primary growth and the histological examination shows marked changes as the result of the application of X-rays to the parts.

Early in June, 1904, the patient consulted the author in regard to a glandular swelling on the right side of the neck. The swelling was situated under the angle of the jaw. It was rounded, irregular in shape and very hard.

Epithelioma was diagnosed and recognizing the impossibility of effecting any permanent cure he determined to try by means of the X-rays to relieve the pain and possibly to arrest the rapidity of the growth of the tumor.

It was impossible to get at the original seat of the mischief in the tongue so attention was diverted to the gland in the neck which at the time was about the size of a large walnut. Treatment was continued daily for about three weeks, then every alternate day until November, 1904. In all the patient received fifty applications of about ten minutes' duration each.

The apparatus used was a ten-inch spark induction coil excited by a 240-volt current. Treatment commenced with the anti-cathode twelve inches from the patient with an exposure of five minutes.

After the seventh application the gland was noticed to be smaller and the exposure was increased to eight minutes, tube same distance from the patient. After the tenth application slight superficial reaction took place. Treatment continued for four days, then discontinued for fourteen days until reaction subsided. Treatment then renewed for sixteen times and then discontinued on account of reaction. Symptoms of liver involvement then took place and treatment by X-rays stopped. The size of the swelling diminished considerably, pain almost disappeared and the patient began to increase in weight. He resumed his employment and was able to work for several months.

He died July, 1905, and up to the time of his death the primary growth gave no trouble and did not increase in size. Necropsy twenty-four hours after death. Body emaciated and dropsy of the lower extremities. The tumor of the tongue was shrunken in size and the surrounding structures were pale and did not appear to be affected by the growth. The primary gland of the neck was an epithelioma in which the cells and nuclei were small and shrunken. The secondary growth in the liver showed that it had been invaded by masses of malignant epithelial cells.

This interesting case shows that the pain and primary growth ceased to increase during the X-ray treatment. It is probable that the new growth in the liver was there when the treatment commenced and improbable that the X-rays had any direct effect in causing metastasis to that organ.

R. R.

Two Cases of Paget's Disease Treated by the X-ray, with a Report of the Microscopic Findings in One of Them After Prolonged Treatment. (*M. B. Hartzell, The Journal of Cutaneous Diseases, July,* 1906.) The two cases are reported because of the very considerable degree of success which attended the treatment, and, more particularly, because one of them afforded unusual opportunities to study microscopically the effect of exposure to the X-ray for a considerable period upon this hitherto intractable affection.

The first case occurred in the person of a woman, 53 years old, with a disease of the left breast of 13 months' duration, which consisted of a circular dollar-sized, sharply circumscribed, bright red, somewhat crusted patch occupying the nipple and areola, a considerable part of the nipple having been destroyed.

Exposures were made in the beginning daily, with the anode at first ten, later eight inches distant from the patch, each seance lasting 10 minutes; as soon as slight reaction was manifest the intervals between the sittings were increased to two to three days. After the thirteenth sitting, when marked redness of the skin was present, it was noted that the patch was smoother and drier; and the improvement continued steadily until, after the nineteenth exposure, five weeks from the beginning of the treatment, the diseased area was completely healed. Two more exposures were made and the treatment was then suspended for one month; at the end of this time the breast was still apparently sound. Two months later, however, when the patient was again seen, the summit of the nipple was covered by a small crust covering a shallow ulcer, and there was also a superficial ulcer in the areola close by the nipple. The X-ray treatment was resumed, and reaction appeared more quickly than before, the skin becoming red after the seventh seance; and after the twelfth, a burn of moderate severity occurred, which healed quickly, however, under a picric acid ointment. In February, 1903, it was noted that the nipple and areola were completely healed with the exception of a small superficial ulcer in the center of the former. A little later some retraction of the nipple began to be noticed; and about this time, too, it was thought that the mammary gland was slightly firmer than on the sound side. Sixty-one exposures were given but the gland continued to enlarge and was finally removed by the knife.

At the time of the operation, material was taken from the site of the nipple, from the areola, from the sound skin remote from the diseased area, and from the mammary gland.

In the first few sections of the areola examined, the epidermis, which was slightly thicker than normal, showed very little alteration of its cells; but upon going over a larger number of sections carefully, slight but characteristic changes were observable. There was moderate parakeratosis and here and there were isolated examples of large vacuolated cells containing a shrivelled nucleus lying free or attached to the cell-wall, situated usually in the lowest portion of the rete, and an occasional large, round or oval, granular, coccidia-like cell. The papillæ were practically absent, and no trace remained of the plasma-cell exudate which usually occupies this and the underlying part of the corium. Scattered throughout the upper portion of the corium were numerous irregular masses of yellowish-brown, granular pigment and there was a moderate degree of degeneration of the collagen. In not a single section were any sebaceous glands seen, and the few coil glands noticed were markedly atrophied.

The site of the nipple showed no very marked alterations of its epidermic covering; the most notable departure from the normal was a species of condensation of the rete by which the intercellular spaces were so diminished in some sections as to be scarcely noticeable, with disappearance of the prickles. There was a decided increase in the density of the corium, with disappearance of the papillæ.

The most significant changes were observed in the milk-ducts. These were filled with swollen epithelial cells many of which had undergone the same peculiar degeneration observed in the cells of the epidermis of the areola, and the center of the ducts was, in most cases, occupied by a mass of granular debris probably arising from necrosis of the centrally situated epithelium.

Sections of the mammary gland showed moderate, but unmistakable evidences of the carcinomatous change. Many of the alveoli, instead of presenting a single row of cells, were entirely filled with swollen epithelium, and frequently contained necrotic masses of cellular debris similar to that noticed in the ducts of the nipple.

The greater part of the alterations just described were, of course, the result of the morbid processes which characterize this disease, but certain of them, such as the disappearance of the plasma-cell exudate, the deposit of pigment in the corium, and the disappearance or atrophy of the glandular structures, were regarded as the direct result of the treatment.

The second case was almost the exact counterpart of the first, both as to its clinical features and as to the treatment and its results.

A. D. R.

The Effect of X-rays upon the Leucocytes in the Blood and Bone Marrow in Leukemia. (*R. J. M. Buchanan, British Medical Journal, July* 14, 1906.) Buchanan recognizes two forms of pathological leucocytosis only; one in which the excess of lymphocytes is derived from the lymphatic glands and tissues, a lymphocythemia; and another in which the excess is derived from the marrow, a myelocythemia. The latter he considers constitutes the leucocytosis which is found in suppuration and in myelogenous leukemia, the difference being one of degree only and not specific.

He examined stained specimens from cases which had not been exposed to the Roentgen rays and found the large myelocytes present in great numbers. In stained specimens from a case after exposure to the X-rays the polymorphonuclears were the most numerous, next came the transitionals and least numerous of all the great myelocytes, fine and coarse. Further, in all cases where the myelæmia was marked nucleated red cells were present and easily detected; after roentgenization he failed to discover any nucleated red cells, a point which he regards as favoring the hypothesis that the rays produce their effect upon the blood by inhibiting production.

He then examined the blood from a number of patients who were undergoing roentgenization at the Royal Infirmary under Sir James Barr with the following results, his idea being to ascertain whether or not the Roentgen rays exercise any direct influence upon the cells themselves.

"Films were made with all care and delicacy, and fixed carefully by the aid of dry heat at 120 degrees C. for 20 minutes. On proceeding to stain and examine them, however, I found that they had not spread well, nor were the cells so sensitive to the stains used. A second batch was but a repetition of the first. Specimens stained with eosin, dried, and counterstained with methylene blue revealed a diffuse staining of the nuclei as compared to the sharp chromatin stain which is normally seen. To Ehrlich's acid hæmatoxylin and eosin the nuclei did not respond as they ought, and even with prolonged immersion they stained but feebly. The use of methylene blue revealed a lack of chromatin and basophile reaction, in many cells to a very marked extent.

"The eosinophile reaction of the coarsely granular myelocytes was in many cells diffluent rather than sharp and refractile. In specimens stained with Jenner's stain the same condition was present, but the eosinophile diffluence was less marked. Many of the large myelocytes and transitional cells appeared altered and paler than usual, others diffluent and broken up, not having the sharp spherical outline one ought to expect in a normal cell. Similar changes were observed by the use of Heidenhain's hæmatoxylin.

"The small basophile cells had suffered in an extreme degree; the polymorphonuclear leucocytes less so and this might be expected, as of all leucocytes they are the most resistant to any form of disintegration. In these, however, the same pallor and diffluence of the nucleus was evident.

"There was a general tendency for many cells of any variety to take on a diffuse stain in which the nuclei were indistinguishable from the surrounding cytoplasm. Fragmentation of nuclei was not uncommon, especially in the basophile cells.

"The so-called 'spread cells' which are always to be found in leukæmic blood I found present in much larger numbers than usual, indicating an increased vulnerability to technique.

"At an autopsy on a man who died from a relapse of leukæmia, and who had been treated by the X-rays, I was enabled to obtain specimens of marrow. On comparing them with films made from the marrow of a case not so treated I found that the coarse eosinophile cells were abundant in the latter, while they were scarce in the former. In the untreated marrow the cells were well formed and the nuclear chromatin responded sharply to the stains used, but after exposure to the X-rays many cells were diffluent and stained diffusely without a sharp chromatin reticulum—a condition similar to that recorded in the blood films.

"In conclusion, I am of opinion that there is evidence to show that the action of the X-rays in leukæmia is of a two-fold character, (1) by inhibiting over-production in the marrow, and (2) by a destructive influence over the leucocytes themselves. The effect is especially noticeable in the cell structures which respond normally to basic dyes, less so in those which respond to acid dyes.

"Further evidence is afforded by the fact that the myelocytosis recurs rapidly when the X-ray treatment is discontinued."

Case of Epileptiform Facial Neuralgia Treated Successively by Section of the Infraorbital Branch of the Trigeminus, Ablation of the Gasserian Ganglion, Resection of the Upper Cervical Ganglion of the Sympathicus and Radio-Therapy. Non-recurrence of pain more than a year after the Use of the Latter Method. (*Drs. Beclere and Haret, Journal de Physiotherapie, June* 15, 1906.) After minor interventions, the first above-mentioned operation was performed and gave no relief at all; the resection of the Gasserian ganglion gave six or seven comfortable months. The resection of the upper cervical ganglion about four or five. Four radiotherapic treatments given directly to the gum were followed by a cure which still maintained itself after a year. Without saying this is a permanent cure, we may say that so far, it has lasted twice as long as any of the temporary improvements afforded by formidable operations.

(*Note.* I know personally this patient; he was a nurse in Bicetre Hospital in 1900 when I was interne there and was under my direct care when Guinard resected the infraorbital nerve. Later I saw him again after Delbet had removed his Gasserian ganglion; a more wretched condition I never saw.—*Ed.*)

F. E. G.

Influence of X-rays on the Blood and Hematopoietic Organs. Treatment of Leukemia. (*Dr. Barjon, Archives d'Electricite Medicale, June* 25, 1906.) After presenting at full length the historical and clinical aspects of the question, the author discusses the interpretation of the facts and dwells upon the action of the rays experimentally applied on the different hematopoietic organs and the different elements of the blood.

The therapeutic results obtained are studied next. He calls attention to the necessity of being very cautious with the technic. Too vigorous an effect would be disastrous. Irradiation of the spleen is the chief treatment, but irradiation of the extremities of the long bones may be useful. A definite judgment cannot be passed as yet on the subject. It seems certain that there has not yet been a single case of leukæmia permanently cured by radiotherapy. But important, sometimes wonderful, improvements have been obtained and no other method can show anything like them.

F. E. G.

Radiometric Methods. (*H. Bordier, Archives of the Roentgen Ray, June,* 1906.) Attempts to measure the output of a focus tube by means of the distance at which it discharges an electroscope are better fitted for the laboratory than for practical use. Measurement of the spark gap by means of the spintermeter shows the internal resistance of the tube which bears a certain relation to the degree of penetration of the ray.

Benoist's method for the measurement of penetration consists in comparing a graduated aluminum scale of increasing thickness with a silver disc. The pentration is measured by the thickness of aluminum which gives the same intensity of shadow as that cast by the silver disc. A milliamperemeter when placed in circuit with the tube measures only the current passing through the tube and thus of course inversely indicates the resistance of the tube, thus when a tube is very high the milliampere reading will be very low, and if the tube be very low the reading may be very high. The milliamperemeter is of no more use for measuring the quantities of X-rays absorbed by the tissue than is the spintermeter, and its reading can never be taken as an indication of the quantity of X-rays emitted from the tube, but it is a convenient instrument for indicating the resistance of the tube.

In the radiometer of Courtade, the degree of fluorescence of a cyanide screen under the influence of the X-rays is compared with that produced by a known specimen of radium, the instrument being gradually approached to the source of the rays until the fluorescence of the two screens is equal, whereupon the distance from the instrument to the tube is measured and recorded. This method is open to the objection common to all such. It is a photometric reading and hence liable to error, moreover the screens deteriorate rapidly and the reading thus diminishes from day to day.

Contremoulin used a method similar to this but he illuminated the standard screen by acetylene light. The foregoing methods determine quality of radiation only but are not quantitative. The following methods attempt to measure X-ray quantitatively.

Holzknecht employs a reagent composed of various salts which undergo color change when exposed to the ray. They are placed in a small capsule with a celluloid cover. Before exposure they are of a dirty yellow color. Under exposure a change to green occurs and by comparing the capsule after exposure with a graduated color scale furnished by the manufacturer, the quantity of radiation received by the capsule may be read off in units. If this instrument were accurate it would be ideal, but the objections are, first, the color of the reagent is not the same as the color of the scale so that a practiced observer may read an error of 50 per cent or 100 per cent. The author has discarded the instrument on account of gross inaccuracy, moreover the tint of the scale fades, thus increasing the error. The reagent employed upon analysis appears to be potassium sulphate contaminated with a little sulphite and held together with copal varnish.

The Holzknecht unit is defined as one-third of the quantity of X-rays which will produce such reaction of the skin as is compatible with its integrity. Such a unit is open to many objections. The dose of the rays required to produce a reaction of the first degree is not the same for all patients and in some patients it varies for different regions of the body. Moreover, the unit of quantity of the X-ray should be defined by its reaction on some reagent other than the living tissue, as the color changes of a definite salt when acted upon by the X-rays, or the quantity of some substance set free by the rays and absorbed by some definite chemical compound. Such a unit would have well defined value, be easily reproduced and always correspond to the same quantity of rays. Under no circumstances in employing Holzknecht's method should the same capsule be preserved for repeated use even though the capsule does return to its original color.

Freund's method involves the use of a two per cent solution of iodoform in chloroform. The iodoform is decomposed by the rays and also by light liberating free iodine. The amount of each is estimated by chemical analysis. The measurements are precise but not adapted for clinical use.

Sabouraud and Noire employ barium platino-cyanide discs which under the influence of the ray slowly change from bright green to brown and the comparison of an irradiant disc with the color scale supplied by the manufacturer gives a reading indicating the amount of radiation absorbed by the disc. The pastille must be placed at a fixed distance of eight centimeters from the anticathode while the tissue under treatment must be placed 15 centimeters from the anticathode if a correct reading is desired. When the pastille has taken the tint "B" on the scale, the skin has received a normal dose which cannot be exceeded without producing erythema, tumefaction or permanent alopecia. The quantity represented by tint "B" produces a temporary epilation only without dermatitis.

The method is open to the following objections. First, many tubes are more than eight centimeters in radius and hence the pastille would have to be placed on the wall of the tube itself where it would be acted upon by heat which of itself will produce a color change. Moreover the rays acting upon the pastille do not correspond with those which fall upon the tissues unless the pastille is placed in a particular situation and it is easy to demonstrate that the pastille should be placed in the principal axis. Thus if one pastille is placed in front of the tube and the other a little to one side, the lateral pastille takes a considerably longer time to assume the same color tint as the one centrally placed. The principal axis must be determined separately for each focus tube; moreover, the pastille does not enable one to measure doses larger than the one prescribed by the inventor. The pastilles must never be preserved for future use even though they do regain their color after use, as it will be found that a pastille once exposed, allowed to regain its color and exposed again, will become tinted much more readily than a fresh one.

The standard scale, moreover, fades with time.

Kohler attempted to measure the output of X-rays by the variation of temperature in the wall of the tube. This is nonsensical.

Kienbock showed an instrument at the Berlin Congress. A piece of photographic paper enclosed in a black envelope is placed upon the tissues; after the exposure the paper is developed and fixed as usual. Its tint is then compared with a scale of tints corresponding to progressively increasing doses of the X-ray. The method is scarcely practicable since it introduces so many chances for error. The paper must all have the same sensitometer reading, must be enclosed in similar envelopes, developed immediately after exposure in the same kind of developer at the same temperature for the same length of time, and then there is the added chance of error in comparing it with the scales.

The author's radiometer takes advantage of the well-known color changes occurring in platino-cyanide of barium on exposure to the X-ray. The bright green color passes through yellow into sulphur to gamboge followed by deep maroon. The cyanide suspended in a thin layer of collodion is placed on the skin itself. The pastilles are square and adhesive on the back for attachment to the skin and a color scale with four tints is supplied. Tint 1, a pale yellow-green corresponding to the maximum dose compatible with the complete integrity of the normal skin. Following such a dose the hair falls out in 20 days, but grows again in another 20 days. The skin shows no erythema unless a very low tube is employed. This is the dose required in the treatment of alopecia, tinea and internal tumors, and each exposure should be separated from the preceding one by an interval of at least one month.

Tint 2, of a sulphur-yellow, is assumed by the pastille when a sufficient exposure has been made to produce a strong reaction of the skin with erythema, tumefaction and desquamation. This is the dose required in the treatment of acne, lichen planus, etc., and should be followed by an interval of at least six weeks.

Tint 3 is almost gamboge and corresponds to a reaction of the second degree accompanied by a true dermatitis of the skin.

Tint 4 is of a chestnut color and corresponds to a reaction accompanied by a necrosis and ulceration of the skin. This dose should never be applied to a normal skin but may be useful in forms of epithelioma, warty or ulcerated, cancroid or rodent ulcer all of which may be cured by a single application of the rays in a dose corresponding to this shown. The colors on the scale have been so prepared that they do not fade when exposed to light. These measurements are accurate, provided the tube is not very soft, in which case an erythema may be produced, which disappears however in a few days and which is probably due to the ultra violet rays. The true X-ray reaction does not appear until several days after exposure. There seems to be little difference in the hard and soft rays in their power to effect this color change in the cyanide, thus with a tube giving rays of penetration 19 Benoist, tint No. 1 was obtained in nine and one-half minutes, and with the same tube so regulated so as to give soft rays of No. 5 penetration Benoist, the same tint was obtained in ten minutes.

In cases of goitre care must be used as the skin over the goitre seems to be unusually sensitive. Bright light must not be allowed to fall on the pastille as this retards the discoloration. The pastilles must be compared with the standard scale in the day light only, as every other artificial light modifies the color of the scale and a new pastille must be used in every case. By the use of this method a sufficient dose for any treatment can be given at a single sitting and the empirical fractional method can be discarded.

A water-cooled tube should be employed in order to avoid the possibility of radiant heat effects upon the pastille.

In a case of warty epithelioma occupying the alæ of the nose with a large cauliflower growth at the extremity, a dose corresponding to No. 4 tint with rays of No. 8 Benoist was given. Two months following the single exposure, the patient was entirely cured, and there is no trace of the enormous epithelioma, which entirely disappeared following a single sitting.

G. C. J.

Some Remarks on Roentgenometric Standards. (*Gustave Reus, Archives of the Roentgen Ray, June,* 1906.) Kelvin declares that a phenomenon is well known only when it is possible to express it in numbers. In the explanation of the unknown and intangible, only ideas derived from the study of the known and tangible are admissible. The assumption that equal changes in the hotness of a body can be measured by equal changes in its volume is not necessarily true. Temperature is not really quality nor is any thermometric scale a true measure of the intensity of heat. The assumption that in the interchange of heat between two bodies, the quantity of heat lost by the one is exactly equal to the quantity gained and thermometrically exhibited by the other is a pure hypothesis, speculative and imaginary. The notions that the persistence and indestructibility of energy rendered is as much a physical entity as matter, is a figment of modern philosophy and the doctrine of the conservation of energy may not prove to be true in its final and lasting form.

Our ideas of measurement of light are rudimentally chaotic and fallacious. The law of inverse squares when applied to light is never fulfilled in its entirety. Were light measurements made in interstellate space filled by the luminiferous ether alone, this law would hold good, but as soon as matter enters into the calculation it produces a modification, for matter, even in its gaseous state, possesses a periodicity of vibration which modifies the velocity of transmission and alters the direction of light undulations so materially affecting the result. Where matter is, all electro-magnetic undulation waves and pulses are subject to modification. This is proved by every discovery of optics.

When applied to radiometry and roentgenometric standardization the law of inverse squares is subject to considerable modification. In the case of corpuscular radiation or electro-magnetic pulses the modifications attendant upon the transmission of these rays through substantial media are great. Hydrogen gas in its most attenuate condition offers an obstacle to their propagation. The different photometers of Rumford, Bunsen, etc., show the degree of illumination of one source of light compared to another, but they do not measure the chemic, thermic or utilitation value of the light. No statement of roentgenometric conditions is complete which does not give specific information regarding the character of the medium of transmission, temperature, barometric pressure, tension of aqueous vapor and contamination of the atmosphere with CO_2.

The quality and thickness of the glass in the walls of the tube materially modifies results in roentgenotherapy. Quartz is more transparent than glass, to X-light, and aluminum even more so. All bodies upon which X-light impinges become positively charged. Hard rays are most effective in charging and a high atomic weight facilitates the change. This charge continues to increase during the first 20 seconds and then remains stationary. It is therefore necessary in all roentgenometric statements to set forth the amount of electrostatic charge imparted to the tube after 20 seconds.

The author asserts that the character and thickness of the medium forming the bulb is a point of fundamental importance in roentgenometric standardization and that this can be expressed in units relative to the electrostatic charge upon its inner surface. As a focus tube serves as a transformer of energy it appears that it would be easy to solve the problem by estimating its capacity as a transformer. Several difficulties however prevent this. We have no reliable data concerning what goes on within the focus tube and the amount of energy expended in creating by-products. We know that only a part is transformed into the X-light, the remainder of the current being dissipated in heating the target, in combatting the change in dielectric viscosity created by the electrostatic charge, in creating radiations of short wave length such as ultraviolet light, etc., besides that which is manifest as high frequency discharges. It is true that with the milliammeter we can obtain a correct idea of the amount of energy entering the tube, but since we do not know what quantity is dissipated within the tube these measurements are of little value to us.

The internal resistance of the tube is a function of the amperage of the entering current. Milliamperemeter measurements afford a fair index to the amount of X-light generated within the tube, but not the quantity of rays available outside. In order to arrive at the latter we must remember that the quality of the rays generated in the tube depends not only upon the electric intensity but also upon the angle of inclination of the cathode and a certain surface characteristic of the target. If we recognize that the radiations in the output of the focus tube are not all of the same dimensions and that the proportion in which they are mixed varies as the angle of inclination of the target, we shall advance and learn how to arrange our tubes relative to the plane of the body of the patient so as to vary the proportion of the various kinds of rays which reach him.

The Benoist radiometer affords no indication of the quality of the rays, beyond that furnished by photometry in light measurements. The author has modified it by substituting the composite prism of aluminum and quartz, split axially for the ordinary disc. Gauging the quantity of X-light by its chemic effects innumerable difficulties arise. Polymerization by which the changes of color of the Holzknecht discs are produced is conditioned by various circumstances not easily controlled. This applies to many of its proposed substitutes; the ionizing test for X-light by means of the electroscope, is open to similar objection. Humidity or the presence of contaminating gas in the medium of propagation nullifies the value of results. Correction for this must be made at the time of experimenting if the data obtained are to be regarded as trustworthy.

It is not generally recognized that X-light has an effect upon osmotic tension and that where a semipermeable membrane is formed by precipitation in the interstices of a porous body the amount of X-light absorbed can be correctly gauged by this means. Reus has constructed an osmo-regulator upon this principle which shows the amount of X-rays absorbed in unit time per square inch of surface. Sugar and salt solutions are introduced into the respective chambers of this apparatus and the disc is formed of semi-permeable membrane of known size (five centimeters in diameter). The readings are directly obtained by noting the osmotic pressure.

It has been proved that the heat engendered by absorption of X-light is not the same for all metals. Two discs of corresponding surface value and thickness are exposed to the action of the focus tube radiations, and the difference is estimated by the thermo-electric method of Angstrom or by the bolometric method of Kurkbaum; the latter has special advantages and has not been applied to the extent which it merits.

G. C. J.

Some Suggestions for Perfecting a Method of X-ray Measurement. (*John Hall-Edwards*, *Archives of the Roentgen Ray*, *June*, 1906). None of the methods at present in use for X-ray measurement approach perfection. At present radiotherapeutists are divided into those who believe in the large, so-called "measured" doses and those who administer small unmeasured doses at intervals. The large measured dose is said to be universally used on the continent with wonderful success, but investigation discloses that it is the exception rather than the rule to find these instruments for measuring dosage in the continental hospitals.

These methods have been boomed out of all proportion to their importance. They have been tried in England with a difference of opinion as to their merits, and few if any of the well-known workers have adopted them for their ordinary use. The large dose, properly administered, especially in the treatment of ringworm, has its merits, but the risk accompanying such treatment is so great that none but the ignorant would dare to adhere to the rules laid down by the originators of this method of measurement. These methods do not consider idiosyncrasy which cannot be measured and in the end judgment and experience in the application of the ray will prove of more value than any so-called method of measurement.

After 10 years' experience Edwards finds that idiosyncrasy plays a much more important part than he formerly thought. But a few weeks ago he radiographed a man for renal calculus and although the exposure occupied less than three minutes yet one week later the skin over the abdomen showed a dark brown patch which corresponded to the opening of the diaphragm compressor. If this patient had received a so-called normal dose of X-rays, the result would have been a bad dermatitis. The methods of Holzknecht and Sabouraud are costly, require constant attention, the color changes are brought about by radiant heat, light and climatic conditions as well as by X-rays and in the end the personal equation when making the color comparison is a variable quantity always open to error.

The two methods which appeal to him are the measurement of the current taken by the tube in series with a valve and milliamperemeter, and the counting of the number of breaks made in the primary current when using a mercury dip; but we have no reliable milliamperemeter and the valve tubes vary as much as the X-ray tubes themselves, hence we are frequently measuring, not what the tube is taking but what the valve is taking.

The photographic method he hopes will prove the most perfect although up to the present time it is a failure owing to the fact that the sensitized paper or film has to be developed during the exposure, but at the same time it seems that the manufacturers ought to be able to make an X-ray printing-out paper, the effects upon which can be read as the exposure is proceeding. We may assume that the amount of silver reduced in a given film during a given exposure bears some relation to the therapeutic results which would follow the same length of exposure.

Benoist's radiochrometer enables the worker to measure the hardness of the rays employed. This meter consists of a disc of aluminum divided into 12 sectors varying from 1 to 12 millimeters in thickness. The disc is pierced by a central aperture in which is placed a plate of silver 0.11 millimeter thick. The sectors are arranged like the figures on the clock's face, No. 1, one o'clock; No. 12, twelve o'clock When used in front of a fluorescent screen or upon a photographic plate the tint of one of the sectors will match the tint of the central disc, and the number of this sector indicates the penetration of the rays employed.

This meter is, however, of little use

unless the exposures be short and made with a very soft tube. The author has constructed a smaller instrument which gives a very much wider reading and measures a longer range of exposure. It is constructed of ferro-type plate having a central square surrounded by 12 smaller squares varying in thickness. The instrument is very useful in making comparisons in the speed of various plates.

G. C. J.

On the Quantimetric Method. (*R. Kienbock, Archives of the Roentgen Ray, June,* 1906.) A true measurement of the amount of radiation absorbed by the tissues can only be made by means of a reagent placed on the tissues and irradiated to the same degree.

Holzknecht in 1902 devised a fairly reliable direct method using pastilles of a potassium salt mixed with copal varnish. In 1905, Sabouraud and Noire brought out a method using pastilles of Barium platino-cyanide but these are less sensitive, must be placed at a stated distance from the tube and carefully shielded from light. In the same year Freund introduced a reagent consisting of a solution of iodoform and chloroform. This reagent is sensitive to light and heat and therefore has not come into general use. In 1905 Kienbock demonstrated his method at the Roentgen Congress at Berlin. Stern in December, 1903, published a paper on radiometry suggesting the use of photographic films, but of this Kienbock was unaware.

His quantimeter consists of a strip of photographic paper and a scale of graduated tints. The paper is the ordinary silver bromide. After the exposure a strip of paper which has remained on the patient's skin during the treatment is developed and compared with the scale. In order that the results may be accurate it is necessary that the development be conducted at a temperature of 18 degrees C. in a solution of constant composition for the exact time of one minute. The paper is then fixed in an ordinary hypo bath and compared with the scale. His unit is one-half that of Holzknecht and equal to one-tenth the maximum dose of Sabouraud and Noire. This method has the advantage of greater exactitude and small differences of dosage may be estimated; the strip, however, requires careful development.

When large doses are to be given the exposure is to be interrupted from time to time and the strip developed. It is also advisable during a longer sitting to expose one of the pastilles of Holzknecht or Sabouraud, the color of which will indicate when the sitting should be interrupted and the strip of photographic paper developed. If a milliamperemeter and a Villard tube are also in circuit the time will give an indication for interrupting the sitting and developing the slip. The accuracy of the method depends upon the ability of the observer to read the scale and to make accurate comparisons. The strips may be laid directly over the part under treatment as the paper absorbs practically none of the rays. The smallest dose measurable is one-quarter X. The smaller dose may be measured by altering the distance of the paper from the tube. Thus if the strip is placed at one-half the tube distance, a tint corresponding to one-quarter X would be equivalent to a dose on the skin of one-sixteenth X. When a larger dose is required, it is better to replace the strip after some time by a fresh one as the darker tints are not so easily compared. The unit of Roentgen light, one X., is equivalent, in its action on the photographic paper, to the light of Scheiners standard benzine lamp acting for 30 minutes at a distance of 30 centimeters. The sensitometer tests of the different samples of paper vary with each emulsion, within small limits, hence, with each emulsion instructions for development must be given. With this method a permanent record of the exposure is obtained and may be preserved and a complete record of each exposure is thus available at any future time. The use of this quantimeter enables the absorptive power of the various materials used as shields to be accurately studied. By covering the part of the strip with aluminum foil one millimeter thick during the exposure a record of the penetration of the ray employed is obtained. Aluminum foil one millimeter thick is equivalent in absorptive power to a layer of water or tissue one centimeter thick.

G. C. J.

Notes on the Use of the Milliamperemeter in X-ray Measurement. (*H. Lewis Jones*, *Archives of the Roentgen Ray*, *June*, 1906.) Jones discusses the milliamperemeter and considers it, when used in conjunction with a Villard valve, an excellent index of the working of the tube, although probably not a method of precision. Its chief advantage lies in giving a continuous indication throughout the whole exposure which is immediately read on the dial, but he doubts whether the X-ray produced bears any direct relation to the magnitude of the current which passes through the tube. This has not been proven. Again there may be a considerable difference between the amount of X-rays produced within the tube and the amount emitted and available for use outside. It is probable that the actual X-ray production is roughly proportional to the current, but is in reality proportional to the Watts expended in the tube.

In all experiments with a milliamperemeter in circuit with a tube, it must be remembered that tubes of low vacuum may carry heavy currents without giving off any X-rays at all, and tubes with a resistance of less than two inches of equivalent spark are not fit for such experiments. The milliamperemeter cannot possibly indicate the difference between the total radiation and the fraction available outside the tube. The method of measurement by pastilles such as those of Holzknecht attempts this with a fair degree of success, but an indicator of greater sensibility than any so far used would be of great value, particularly if it were acted upon by the X-ray alone and not by light, so that it could be used in open daylight.

The thickness of the wall of the X-ray tube is a very important factor and the proportion of rays absorbed by the wall varies with the hardness or softness of the tube. In very soft tubes the entire production of X-rays may be absorbed by the wall of the tube as has been proven with the tubes furnished with aluminum windows. A good milliamperemeter, when made " dead-beat," is capable of measuring that part of the current passing through the tube which is concerned in the production of the rays, provided the current is rendered unidirectional by the insertion of a valve tube in the circuit, and also that the interruptions occur frequently enough and the impulses are uniform in strength.

G. C. J.

The Dose of Roentgen Rays. (*Bohumil Jirotka, Fortschritte auf dem Gebeite der Roentgenstrahlen, May* 29, 1906.) Jirotka uses as his measuring instruments the milliamperemeter and the voltmeter. In general he states that with the same tube, the same inductor, and the same number of interruptions, the product of the secondary current in milliamperes, the primary tension in volts, and the period of time in minutes, a constant value of the rays can be obtained.

G. E. P.

A New Chromoradiometer (Concluded). (*H. Bordier, Archives d'Electricite Medicale, June* 10, 1906.) A great advantage of the new instrument is that the tablet is pasted directly on the skin instead of being at a fixed distance from the anticathode. This gives a far greater security in the dosage than any other method. A few precautions must be observed; keep the operating place rather dark, so as not to delay the change in color of the platino-cyanide; always compare the standard shade and the other under natural, never under artificial light; never use again a tablet that has already been exposed to X-rays.

The writer condemns in no uncertain terms the method of fractional doses in radiotherapy which he declares empirical and dangerous and which he hopes will soon be abandoned by all radiotherapeutists. He reports a few cases which illustrate the safety and reliability of radiotherapic technic with his radiochromometer and the truth of his contention in favor of massive doses of X-rays.

F. E. G.

Physiological and Therapeutical Study of the Radiations Emitted by Radioactive Bodies and of Their Emanations. (*M. V. Balthazard, Archives d'Electricite Medicale, June* 10, 1906.) The great hopes engendered by the discovery of radium have not been realized; its rays are powerless to modify lesions which have shown themselves resistant to X-rays. This is not surprising if we come to think of the great analogy between these kinds of rays. The α-rays of radium are, like the "Canalstrahlen" of a radiographic tube, very short and have a very slight penetrating power; the thin film of mica which in medical appliances separates them from the tissues, is enough to stop them; consequently they play no part in the therapeutic and physiological action of radium. β-rays, like cathodic rays, are luminous. The luminosity of radium being weak, we must admit that they have only a small influence on tissues. γ-rays, while they have certain properties in common with the two preceding kinds, are much more penetrating and may be compared to X-rays. These γ-rays are the only physiologically active ones. Thus there exists a parallelism between the action of X-rays and that of radium radiations. But the latter has considerably less intensity; a Roentgen tube is a powerful scource of X-rays, while radium bromide, even of the highest purity, is only a very weak source of γ-rays; its action is very superficial and does not go more than a few millimeters deep. As Beclere puts it picturesquely, radium is the *pocket edition* of the Roentgen tube. Consequently, the therapeutical usefulness of radium would be more than limited if its practical convenience did not incite physicians to apply it in cases of superficial cutaneous lesions and of diseases of mucous membranes where the direct application of X-rays is difficult.

Besides emitting rays, radioactive substances give to other inactive bodies an *induced* radioactivity; and they communicate the same power to gases which have been in contact with a solution of one of their salts. The latter property is only temporary and finds a plausible explanation in the hypothesis of the formation of a gaseous *emanation* which mixes with the other gas. Said emanation plays a most important part in the life of individual beings and of worlds. Of all radioactive substances, radium is the only one that has been studied sufficiently.

A.—The *radiations* of radium produce on the skin lesions manifestly similar to those of X-rays: *burns* appearing long after the exposure and healing very slowly. Radium rays have a necrotic influence on cells, but some cells are more resistant to them than others. In men and mammals, the most sensitive structures are vascular endothelia and lymphoid cells. Soon after the irradiation of a part of the integument, the dermic vessels show remarkable alterations; proliferation and hypertrophy of the endothelium which fills progressively the lumen; after a few days, a thrombus completes the obstruction of the vessel. These vascular lesions are primary and the cutaneous ulcerations secondary. The action on the lymphoid cells has been directly demonstrated by Heineke. By placing a capsule containing radium directly in contact with the spleen, he has produced an almost complete atrophy of the follicles of the latter. Hence possible usefulness of radium in lymphogenic leukaemia.

On the testicle, radium like X-rays has an azoospermic influence. The nervous lesions described as a cause of death after a prolonged application of radium near the medulla or the cord seem to depend both on the cutaneous lesions, and on the vascular changes.

This effect on the linings of the blood-vessels has been made use of in treating vascular naevi; also superficial cancers and lupus. Good results have been obtained but in no wise superior to those of Roentgen-therapy. Radium has been used in the treatment of cancer of the esophagus where X-rays are difficult to apply. Much has been said concerning the analgesic action of radium in neuralgia and tabes. That radium may favorably influence a superficial neuralgia is beyond any reasonable doubt but it is most unlikely that it can have any action on as deep-seated a nerve as the sciatic. The good results seen sometimes in such cases must be ascribed to suggestion. Radium has an action on microbes, on the venom of snakes, on the virus of rabies and will probably become susceptible of important applications in the treatment of diseases caused by those agents.

B.—The *emanation* of radium emits the same radiations as radium itself and has all the properties of a gas with this difference that it destroys itself spontaneously so that it loses half its activity in four days. It diffuses most readily through the organism. A prolonged inhalation of radium emanations kills small animals. Respiration is first modified, later the animals remain motionless but there is no paralysis. After death the principal lesion is an intense congestion of the lungs without the interstitial hemorrhages. The number of leucocytes is greatly reduced. The liver, the kidneys and the brain show no naked-eye lesions save an intense congestion. The tissues of animals killed by the emanation of radium are radioactive and this radioactivity is strongest in the hair. The lungs and the adrenal bodies are also very strongly radioactive. The body of a guinea-pig placed on a photographic plate wrapped in black paper gives a clear imprint. This radioactivity is due partly to induced radioactivity but also to the presence of emanations dissolved in the liquids of the body. Balthazard has made some experiments in order to determine what part must be ascribed to each one of these factors. Perhaps some day the injection of water containing dissolved emanations will prove useful in the treatment of diseases of the nutrition and of certain infectious and virulent diseases.

C.—From a technical standpoint, it is good to have the salt spread in as thin a layer as possible and to use the sulphate instead of the bromide because the former is much less hygrometric than the latter and consequently emits less emanation and more radiations. As the rays are stopped by any sheet of aluminum or mica, even very thin, the salt should simply be covered with a thin layer of some protective varnish.

The measurement of the quantity of radiations administered during a treatment is important; it may be effected with Holzknecht's apparatus. We do not find in radiumtherapy the causes of variations which make precise measurements so difficult a question in radiotherapy, and as an operator will hardly have many samples of radium in his possession, it follows that the problem is simpler with radium than with X-rays.

The emanation is eliminated in a short time by the human body and cannot be injurious. This emanation is given, either by injection of a radioactive water, or by injection and inhalation of a radioactive gas; its action lasts only a very short time. In order to obtain this emanation, we may evaporate a solution of a radium salt and collect the distillate, or simply place a solution of radium bromide in a closed receptacle and after four or five days pump out the gases, which then contain the largest quantity of emanation they will ever contain.

F. E. G.

Rectal Feeding. (*T. J. Bennett, The Texas Medical News, June,* 1906.) The indications for rectal feeding are:

1. Any temporary obstruction to the entrance of food into the stomach, such as swellings about the throat, growths, foreign bodies, etc.
2. Paralysis from diphtheria, delirium, coma, or conditions of the insane when refusal to take food is persistent.
3. Gastritis, gastric ulcers, cancer, or any kind of obstruction at the cardiac or pyloric ends of the stomach, or along the alimentary canal above the rectum.
4. Reflex vomiting when unduly prolonged, such as from seasickness or pregnancy.
5. Conditions of exhaustion from wasting diseases where defective absorption and extreme anorexia are persistent, as supplemental to stomach feeding.
6. Surgical operations upon the stomach and upper alimentary canal.

All nutritive enemata should be predigested. The use of undigested enemata is attended by material disadvantages. Fermentation, gas, and even tenesmus and mucous discharges always follow in greater or less degree the persistent employment of undigested milk, eggs, broth, etc.

Life has been sustained for many months by carefully predigested and carefully administered enemata.

This method of sustaining the organism should be more generally resorted to, not only where the use of the stomach is out of the question altogether, but especially as supplementary to stomach feeding in certain wasting diseases and exhausting conditions, as reflex vomiting. Cases of extreme reflex vomiting from pregnancy have sometimes yielded in a day or two to nutrient enemata alone.

One or two per cent of alcohol in a normal saline menstruum, to which the predigested food is added, makes the most satisfactory enema. This should be thrown into and above the sigmoid flexure, and the patient should be required to remain in the recumbent position for at least one hour. Almost any patient with a healthy bowel will tolerate eight to ten ounces of warm fluid, if gently administered, and many will retain even a pint. Where there is irritability of the rectum the smaller dose is advised, and five or six drops of tincture of opium should be given with the enema. When life is to be sustained for several weeks, the patient must be kept in bed all the time. It has been shown that one-fifth less nutriment is required by the organism, when the patient maintains the recumbent position.

Peptonoids and panopepton are of decided value in rectal feeding. Two ounces of either, diluted with six or eight ounces of warm normal salt solution, constitute a favorite enema, which may be repeated every three to five hours. In 30 to 40 minutes after this dose has been injected, the patient will usually express a feeling of well-being, and it is frequently noticeable that a slight flush is seen on the cheeks, as a result of the stimulation from the alcohol and salts contained in the food.

In surgical cases, especially after

capital operations, the use of such an enema, repeated every four hours, and continued for one or two days, fulfills two important indications, the supplying of needed fluid and of stimulating nourishment.

The advice to wash out the rectum and colon once or twice every 24 hours should not be followed in all cases, because sometimes the washing process initiates a high degree of irritability, which prevents rectal feeding. It is rarely necessary, unless the food has not been completely predigested, and fermentation has taken place in the bowels.

Milk may be predigested by dissolving five grains of pancreatin and 20 grains of bicarbonate of sodium in one ounce of water, and adding one pint of milk. To this may be added the whites of one or two eggs, but the digestion must be complete. Generally two hours for digestion, when the food is to be used in the bowel, is better than one hour.

Whatever enema is used, it should be placed in or above the sigmoid flexure. The absorbents are more active in that portion of the bowel, and, besides, the nutrient material is conveyed direct to the liver through the portal circulation, whereas the hemorrhoidal veins empty it into the vena cava, the less desirable of the two routes. The colon is the only second stomach.

G. E.

Diet in Tuberculosis. (*Herbert Maxon King, Medical Record, July 21, 1906.*) When recovery from consumption has occurred it has always been primarily by virtue of an improved nutrition.

There is a general impression today that if we " build up the patient the disease will take care of itself." The requisites to this building-up process are essentially — good food, pure air, and proper rest. Other factors — climate, light, water, drugs, etc., are of secondary importance.

Although it may not be possible to formulate a dietary acceptable as a standard for tuberculous invalids as a whole, there should be no difficulty in agreeing upon certain fixed principles generally applicable, and which should serve as a basis upon which to build the group or individual dietary.

The generally accepted standard of the amount of food necessary to maintain good health in a normal adult human being is 30 to 35 calories per kilo of body weight while at rest, and about 40 calories per kilo of body weight for an individual under the ordinary conditions of life.

The relative proportions of the classes of food stuffs going to make up this number of heat units are theoretically, proteids, 12; fats, 5, and carbohydrates, 50 (Voit's standard). Not only the relative proportions but the daily total of food must necessarily vary with varying conditions, both of the individual and of his environment. It is possible that too much attention has been given to proteids and fats, and too little to carbohydrates.

A good digestion simplifies the problem. Given a sufficiently generous diet, nature will attend to the demands of the organism. There need be no anxiety as to the relative proteid, fat and carbohydrate content of the ingested food, and in such cases the appetite alone is a sufficient criterion.

With a poor digestion and assimilation it is of the greatest importance not only to ascertain approximately the digestive capacity of the individual for the several elements, but to avoid overfeeding, either in total quantity of food, or excess of any constituent element. On the other hand, the results of most painstaking effort are not infrequently disappointing and discouraging, and without being able to ascribe a cause, we may be forced to see a patient continue to lose weight and strength even while ingesting an amount and variety of food more than sufficient to sustain a robust working man.

Of course it is not merely a question of the amount and latent heat value of fuel put into the furnace, but of even greater importance, the completeness of the actual combustion upon which depends the total of energy derived. Hyperalimentation, if indiscriminately applied, is capable of working irreparable mischief.

Observations, extending over 14 days, made upon six men and six women, one with a very moderately active lesion, and the others with quiescent or arrested lesions, all of about their usual weight, seemed to demonstrate that, generally speaking, a tuberculous invalid without acute symptoms may be given a properly proportioned diet of from 45 to 80 calories per kilo of body weight, without danger of overfeeding, but one must exercise vigilance, for there are many exceptions to this general rule. Such a diet may be provided, in an institution, for 40 patients, at a cost of 35 cents a day per patient.

In acute cases, with high temperatures and rapidly destructive lesions, a heavy proteid diet is quite as much out of place as it would be in typhoid fever. Yet nourishment must be supplied if we expect to change the type of the process. It is in such cases that an almost exclusive milk diet best serves the purpose — raw, cooked, or variously modified, milk is the food with the widest range of usefulness in these cases. Three liters of whole milk, divided into unequal portions, the largest to be given at ordinary meal times, can be taken by most patients without inconvenience every 24 hours, and represent 99 grams of proteid, 120 grams of fat, and 150 grams of carbohydrates, or 2137 calories. This is, of course, insufficient for the body needs in such cases, and will not prevent weight loss but will check it, and will give the organs concerned in digestion, assimilation and elimination the least strain at a time when it is most urgent to save the patient all unnecessary expenditure of energy.

As the type of the disease changes, the milk diet must, of course, be supplemented and gradually superseded, for it cannot with safety be indefinitely continued.

In advanced cavity cases much underweight and without appetite but without acute symptoms, the ordinary three or four meals a day are not enough. In such cases a two-hour diet may be advantageously substituted for the regular meals.

The following is a fair representation of such a dietary, subject to more or less daily modification, to meet the whims and tastes of different patients, or of the same patient on different days :

		grams.
6 a.m.	Milk	190
8 a.m.	Cocoa	120
	Toast	28
	Cereal	80
10 a.m.	Eggnog	215
12 m.	Soup	120
	Scraped beef	37
	Bread	42
	Butter	27
2 p.m.	Cocoa	120
	Crackers	6
4 p.m.	Beef juice	96
	Milk	190
6 p.m.	Rice	30
	Custard	40
	Egg	45
	Toast	28
8 p.m	Milk	190
10 p.m.	Milk	190
Total,		1,794

This amount represents 127 grams of proteid, 254 grams of fat and 221 grams of carbohydrate. Such a dietary for a patient weighing about 45 kilos (100 pounds) is equal to slightly over 60 calories per kilo of body weight. If gain of weight does not appear after reasonable trial of such a diet, it is probably wiser to increase the carbohydrate, than the fat or proteid constituents.

The tastes, habits, and peculiarities of individuals, even their heredity, are important factors. Variety, preparation, and the manner of serving of foods are matters which have an important bearing upon the success or failure of the treatment, and the psychotherapy, which must and does enter all successful treatment of the consumptive, is more important in diet prescriptions, perhaps, than anywhere else.

Contradictory opinions and prejudices are entertained concerning the value of alcohol as a food. Where there is a tendency to anorexia, where digestion is sluggish, especially where milk is ill borne, where weight gain is not satisfactory, and, of course, where there is no specific contraindication, nothing else will quite take the place of some of the light wines or malt liquors in promoting the building up process. In such cases it is both a food which is immediately available to the tissues, and a mild and harmless stimulant to digestion.

Light clarets, Rhine wines, or even Burgundy, often may be advantageously permitted with midday and evening meals. Distilled liquors have a much narrower field of usefulness in the dietetics of tuberculosis, but are permissible in certain cases, when alcohol is indicated, and the more bulky forms are ill borne. When they are used, they should be well diluted.

The standard food requirements for tuberculous invalids must be determined by further thorough studies of metabolism. Having acquired more accurate data, it will be possible to meet the food requirements, and at the same time to avoid the dangerous error of over-feeding.

G. E.

CLIMATOTHERAPY

The Fresh Air Treatment of Acute Respiratory Diseases with Special Reference to Pneumonia. *(J. M. Anders, The Medical Record, July 7,* 1906.) Anders is altogether committed to the admission of pure outside air in abundance to the sick-rooms of persons suffering from the various forms of acute respiratory disease.

It required a long time for the profession to learn the great value of an out-door existence in the treatment of tuberculosis, but its value has finally been recognized. To be effective (in tuberculosis) pure air must be constantly applied, without regard to the seasons of the year or the periods of the day, although a certain degree of protection can and should be afforded during climatic extremes and under different conditions of disease and naturally pure air is primarily an effective prophylactic agent against the great majority of both acute and chronic respiratory affections. It is not improbable that the higher incidence of pneumonia in winter and spring is due not so much to the direct effect of low temperature, augmented barometric pressure and velocity of the winds, as to the closer confinement of the populace indoors, in the stagnant air of living-rooms from which the sunlight is excluded, and which tends to lower vitality and decrease resistance on one hand, and to favor rapid multiplication, and increased virulence of the specific poisons on the other.

In victims of severe acute bronchitis with lowered resisting powers a chill constitutes a dangerous experience as a rule. Hence such conditions permit an out-door existence only in fine weather and in the milder climates or seasons. But frequent changes in the indoor air without incurring a strong draught favor the cure of cases of acute bronchitis even in elderly subjects and children. Moreover, this method exerts a hardening effect.

Fresh air properly applied then is generally to be recommended in the usual forms of bronchitis. In cases of neurotic asthma, marked improvement is often witnessed as the result of a suitable change of air. Now, while we cannot meet the variable climatic indications of this disease at home, the immediate beneficial effect of a flood of fresh air from an open window during a paroxysm is so well-known as to make the suggestion appear superfluous.

It is obvious that an atmosphere containing a full complement of oxygen is demanded in pneumonia, a disease in which a large proportion of the air-cells are rendered temporarily useless. As Northrop has stated, nothing stimulates the heart better than a current of fresh cool air upon the face : it quiets restlessness, favors sleep, improves secretion and digestion and in short meets most of the indications for the treatment of pneumonia in infants. It cannot be doubted that the lowering of the temperature of the room incident to the admission of pure, cold air is one of the most important elements in the favorable results. Under the influence of a low temperature the heart's action becomes slower and the pulse tension increased. Cold exerts a tonic influence upon the nerves and vessels in the skin, and indirectly it has an important effect in lessening the tendency to internal congestion. By reason of the stimulation of the respiratory function more oxygen is absorbed.

It is Anders' belief, based upon his experience with the fresh air treatment, that pneumonia patients are in no danger of contracting cold from filling the room with clean outside air, and that the mere breathing of fresh air or the flowing of cool air over the face while the patient is confined to bed is practically unattended with risk. Of course each particular case must be considered on its own merits. Thus in certain forms of secondary pneumonia it might be inadvisable, *e. g.*, when pneumonia supervenes in the course of advanced Bright's disease or in persons having a highly sensitive nervous organization, etc. These cases, however, are exceptional and there is no difficulty in selecting suitable cases for the fresh-air treatment.

J. K. C.

AEROTHERAPY

Cold Air in the Treatment of Tetanus and Yellow Fever. (*W. W. Crane, St. Louis Medical Review, July* 7, 1906.) Crane considers that the hot weather may have a good deal of influence in developing tetanus and may have something to do with the greater development of this trouble which occurs after "Fourth of July" injuries, as this holiday occurs in the summer. He also cites some experiments by Vincent who injected a number of guinea pigs with a tetanus culture, keeping some as controls under ordinary conditions and placed the others in an incubator until their temperature reached 107 degrees Fahrenheit, when they were removed. All of those whose temperature had been thus elevated developed tetanus and died, while none of the controls were affected. He regards this as indicating that the resistive powers may be lowered by heat which allows the germs to develop, and suggests that patients with this disease be placed in cold storage, citing a case which occured in the practice of Dr. C. C. Allison of Omaha in support of this statement. This patient was a boy ten years old who contracted a severe tetanus from a wood splinter wound of the foot. He grew desperately ill and at the suggestion of Dr. W. J. McCrann of South Omaha, was removed 20 blocks and placed in a cold storage room of a brewery where he soon got better. His parents, however, grew frightened at his somnolence and removed him to his home whereupon he rapidly grew worse. He was again placed in the cold storage room and rapid improvement and entire recovery immediately supervened. He was in the cold storage seven days and at all times was covered by blankets and a rubber sheet.

Crane also suggests that this procedure be investigated in the treatment of such diseases as measles, typhoid fever, yellow fever, etc., which are much more severe in warm than in cold climates, yellow fever in particular being instantly checked as soon as the first frost appears.

MISCELLANEOUS

X-ray Work in the Colonies. (*Dr. Audhuy, Archives d'Electricite Medicale, May* 10, 1906.) The writer, an ex-assistant of Prof. Bergonie, now an assistant surgeon in the French colonial army, has sought to realize a complete radiotherapeutic outfit, light, easily transportable and durable, which could meet easily the exigencies of a radiologic service in colonial territory. He has used Gaiffe's portable apparatus which solves part of the problem. But in that apparatus the necessary primary current is supplied by accumulators. It therefore becomes necessary to have an electrogenic group with which these accumulators may be recharged when a supply center cannot be reached. The small dynamos now in general use to charge accumulators for automobiles answer this purpose very well. Some of them, manufactured by Glænzer, are light, strong, not cumbersome and can give 15 volts and 3 or 4 amperes. These dynamos are known under the name of "dynamo-magneto Dayton" and are provided with an ingenious device, an automatic cut-out most useful when said dynamo is used to charge accumulators. The cut-out shuts off the current automatically when the dynamo revolves fast enough to produce the current necessary for the filling of the accumulators, and inversely interrupts the same, automatically, when the speed of the dynamo decreases, thus preventing the battery from discharging itself into the dynamo. With a normal speed the dynamo can give 30 watts; with a forced speed, 50. It gives 15 volts with 2000 revolutions per minute, and weighs about 80 pounds.

As a motor Dr. Audhuy has used a bicycle, the tire of which had been removed and replaced by a leather belt. The bicycle was fixed on a suitable support. Better results from the standpoint of regularity have been obtained with a tandem bicycle, instead of a single one. In the latter case, the crank of the pedals of one of the riders must be placed at a 90 degrees angle with those of the other rider, so that when one reaches the dead point, the other gives his strongest effort. It would be probably easy to replace the human motor by a small motor of the type used for light motorcycles; it is probable that the latter would give more strength and more regularity and the question of fatigue would not have to be considered, but the writer found no opportunity to test the latter scheme. With a single bicycle, the charging of six 20-ampere hour accumulators is not hard work if only two accumulators are charged at the same time. The charging may be effected in ten hours, but requires much more exertion from the men, and they have to take turns every fifteen or twenty minutes. If the accumulators are not completely discharged, less time is required. As an average, an hour and a half or two hours are sufficient to give back to the battery what it has lost during an hour's work. The tandem bicycle or the gasoline motor yields quicker results.

The writer has sometimes supplied the coil directly from the dynamo. This is hard and tiring enough, and the spark is thin and the current is slightly uneven every time the pedals reach a dead point, but nevertheless useful results may be obtained. This irregularity may be compensated in radiographic work by a longer time of exposure. Glass negatives must be deemed sufficient in colonial work because paper proof require too considerable an outfit, and the intense light makes it imperative that manipulations should be restricted as much as possible. Films are not practical, and cannot be kept on account of the heat. Photographic solutions should be always extemporaneously prepared from the solid chemicals kept in well stoppered bottles.

From the standpoint of transportation, the packed dynamo weighs about fifty pounds; if coupled to a small gasoline motor, sixty pounds. The coil is the most delicate thing to handle on account of the paraffin and the heat. It can be well protected with felt. Weight about one hundred pounds. It is safer always to have four tubes in case of possible mishaps, and in order not to use a single tube up quickly by heating it too often. Carefully packed in cotton the tubes will weigh about ten pounds. The total weight of the whole instrumentation is about 150 kilogs. (330 pounds). Such an outfit has travelled with the writer several hundred miles; the interrupter alone needed regulating after the different trips.

Treatment of Chronic Diseases of the Heart by the Nauheim Methods: Its Indications and Contra-Indications. (*Francis P. Kinnicutt*, *Medical Record*, *May* 19, 1906.) Kinnicutt has been able to study this subject under unusually advantageous conditions during the past two years as he took a five-weeks course of treatment in Nauheim himself, and, during these visits, was granted full opportunity to study the cases under treatment by Professors Schott, Heinemann, and Grœdel.

The efficacy of the Nauheim treatment in many forms of rheumatism was recognized in the early part of the last century and its use in organic disease of the heart was brought about by an observation of the unexpected improvement which took place in this condition in patients who were under treatment for rheumatism.

The chemical constituents of the water used are chloride of sodium (from 2 1-5 to 3 per cent), chloride of calcium (from 1-6 to 1-4 per cent) and free carbonic acid gas (from 1.0074 to 2.3764 parts per one thousand grams). The range of the natural temperatures of the different springs is from 88.16 degrees F. to 95.54 degrees F. A system has been elaborated which permits of a wide variation in the saline and carbon dioxide strength of the baths, and they are denominated and their peculiarities described as follows:

"1. The ordinary brine bath (gewohnliches Soolbad), free from carbonic acid but rich in salines.

"2. The thermal brine bath (Thermalbad), rich in salines and containing a considerable amount of carbonic acid in combination.

"3. The thermal effervescent bath (Thermal-Sprudel), holding an intermediate position between the thermal and the bath next to be described.

"4. The effervescent bath (Sprudelbad), which receives its waters direct from the subterranean springs, with the full saline and carbonic acid content, and with only a very slight diminution in their natural temperature.

"5. The current thermal brine bath and current effervescent bath (Strombad and Sprudelstrombad). These baths also receive the water as it leaves the springs. The water forcibly enters at the lowest level of the bathtub, and by means of overflow pipes at the top leaves it throughout the entire period of immersion. The saline strength of the various baths can be increased at will by the addition of the crystallizable waste product, motherlye (Mutterlauge), of the neighboring saltworks.

"The course of baths usually begins with the brine or the thermal brine bath, strengthened after a few immersions by the addition of gradually increasing quantities of motherlye. After several days the Thermal-Sprudel, and again after a similar period—usually a fortnight from the beginning of treatment—the effervescing sprudel baths are substituted. The effervescent current baths are reserved for the final days of treatment, and often are not given. The duration of the baths at the beginning of treatment is not longer than six to ten minutes, gradually lengthened to 20 minutes; the latter time is rarely exceeded. The temperature of the first baths is generally from 92 degrees to 95 degrees F. It is reduced with succeeding baths. Temperatures lower than 83 degrees F. are rarely used. Usually not more than two or three successive baths are permitted in as many days, when a day of interval is prescribed. The patient, on emerging from the bath, is wrapped in heated towels and quickly dried by the attendant. Rest for at least an hour, in the recumbent position, is imposed after the bath. The number of baths varies from 20 to 35. The system described generally prevails, but many variations are and should be made, in my judgment, to adapt both the baths and the exercises, directly to be described, to the individual case.

"In healthy subjects the immediate effect of immersion in the baths is a notable diminution in the frequency of the pulse and a slight increase in its volume. Usually there is also a slight increase in the depth of the respirations, with a corresponding decrease in their number. A vasodilatation of the superficial vessels, as indicated by the uniform reddening of the surface of the body is noticeable. This is especially marked in the effervescing Sprudel bath. The blood pressure has a short initial rise, followed by a depression to or below the original level, succeeded by a renewed rise to its former height.

"A series of very careful observations in regard to the effect of the bath upon the pulse was made by me in my own person during my visit in 1904 and confirmed in the summer of 1905. The pulse was taken before undressing, and any increase in frequency during the act was allowed to subside before immersion. After one and one-half to two minutes of immersion, either in the simple brine or in the effervescing brine baths, the frequency was invariably reduced from eight to ten beats, if the pulse was 76 or more before immersion, and its volume was notably increased; if under 70 before immersion, the reduction did not exceed six beats. The pulse rate is usually accepted as a guide for the length of the bath. Its duration invariably should be within the limits of causing any increase in the frequency of the pulse. In my own case, at the beginning of treatment, the pulse rate began to quicken after ten minutes; later in the treatment, an increase in frequency occurred only at the end of a 20-minute immersion. The reduction in the pulse rate was fully maintained during the subsequent period of rest.

"The evidence of vasodilatation of the surface vessels was always well marked, and with it there was a sensation of general and very agreeable warmth following the first sensation of coolness."

The Schott resistance exercises consist of movements executed by the patient and slightly but not completely resisted by an attendant, so prescribed and regulated as to exercise nearly every collective system of voluntary muscles in the body. The effect upon the respiration and pulse should be depended upon largely as a guide for the degree of resistance and the number of movements given, and increase in the frequency of either means that the exercises should be modified or discontinued. The duration of this movement treatment is usually from fifteen to thirty minutes including the intervals of rest. The physiological effect of these movements is described as follows:

"Coincident with the beginning of the exercises there occurs a diminution in the pulse frequency (three to four beats) and a rise in blood pressure (ten mm.). During the second half of the movements the blood pressure fell to its original level, the pulse frequency was unaltered. With the cessation of the exercises (thirty minutes' duration) the blood pressure further fell (ten mm.) during thirty minutes, and the pulse rate seven beats in five minutes, at which point both were maintained. After forty-five minutes the blood pressure had risen to its normal level, but the reduction in the pulse frequency persisted. The number of respirations remained the same throughout the exercises. The sphygmogram showed a marked increase in the volume of the pulse during the exercises, the pulsations being nearly double their former size."

Upon suitable cases of cardiac dilatation the effect of these Schott exercises and the baths is to induce a shrinkage of the cardiac area which has been demonstrated roentgenographically. This shrinkage sometimes amounts to half an inch in the left cardiac and an equal amount in the right cardiac outline after single resistance exercises of twenty minutes' duration including the intervals of rest. This diminution in size is very temporary after a single exercise but repeated exercises cause it to last longer and sometimes to remain permanently. The effect upon the heart action is to produce a more energetic systole and dilatation of the peripheral arterioles. In Kinnicutt's experience the most brilliant results have been obtained in cases of enfeebled, relaxed, dilated hearts following prolonged and exhausting diseases, acute infectious diseases, and anemia. In incurable organic disease the best results are obtained in mitral insufficiency with dilatation. The relief of dyspnea, of passive congestion of the various organs, the amelioration of irregular action, and a diminution in the size of the heart, have been more rapid than by any other method of treatment.

In aortic insufficiency little good may be expected from this treatment and where dilatation is marked with a corresponding loss of compensation, the treatment may do harm.

In angina pectoris of the functional or vaso-motor type employment of this method will sometimes give good results but it should be applied with great care.

In connection with its employment in general arteriosclerosis he says:

"Groedel regards cases with a blood pressure of 150 mm. (systolic pressure, Riva Rocci) as appropriate for treatment. Pressures above 170 mm. he believes to be unsuitable.

"A decision on the advisability of the baths and exercises in myocarditis, other than the forms previously described, is a difficult one. The signs and symptoms of even grave forms are notoriously doubtful. A marked cardiac inadequacy, however, in the absence of evidence of valvular disease and noteworthy dilatation, especially if associated with arteriosclerosis, may reasonably be regarded as a sign of a grave impairment of myocardial integrity, and constitutes, in my opinion, a positive contraindication for treatment."

General emphysema is a positive contraindication.

Among the indications for modification of the baths and exercises he mentions failure of the usual reaction during and after immersion where the usual cutaneous vasodilatation is lacking and the patient feels cold, yawns, and has slight nervous rigors. This does not necessarily mean that the baths should be discontinued but that they should be modified, as by increasing the saline content of the bath.

Indications for modification in the employment of the exercises are an increase in the frequency of the pulse or respirations, dyspnea, or fatigue on the part of the patient.

Indications that both baths and exercises are unsuitable in any given case are a marked fall in blood pressure following the same with an increase in the area of cardiac dullness during their administration.

In general as regards administration of the exercises he says:

"To be efficient they must be attended with 'little exertion and no fatigue.' A certain amount of training of the patient and a careful selection and instruction of the operator is necessary. To secure the proper conditions, the patient must be taught not to hold his breath or his body rigid (a common tendency), which involves increased conscious effort, to make the movements slowly and very steadily, and to recognize the degree of resistance that is advised by the physician. The operator should be light of hand, intelligent, and trained in the observation of ordinary symptoms. The use of too great resistance, sometimes at the demand of the patient, is the most common fault of the operator and the most difficult to correct, I have found. At the beginning of treatment I am in the habit of demonstrating the degree of resistance I wish employed in the individual case. In so adapting the treatment, it is needless to say that the pulse rate, the blood pressure, the site of the apex impulse, and the outline of the heart must be noted before and after the first employment of the exercises, and from time to time throughout their use."

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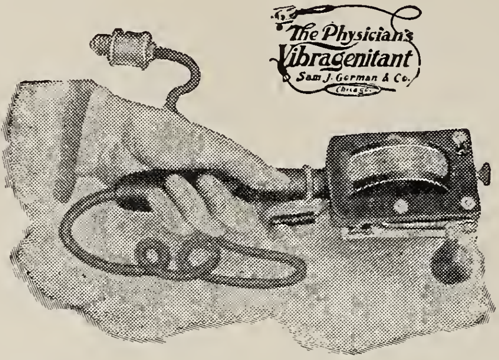

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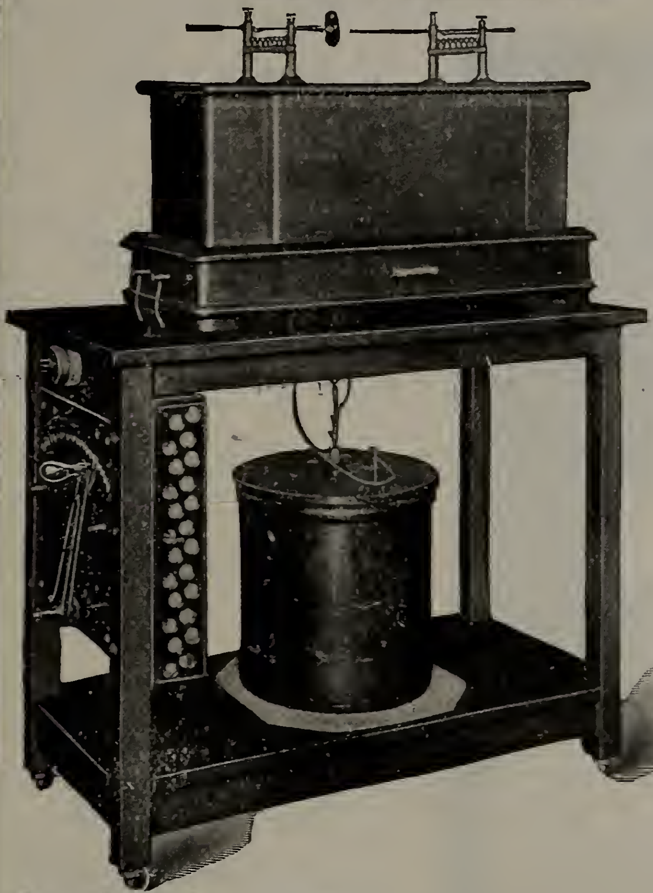

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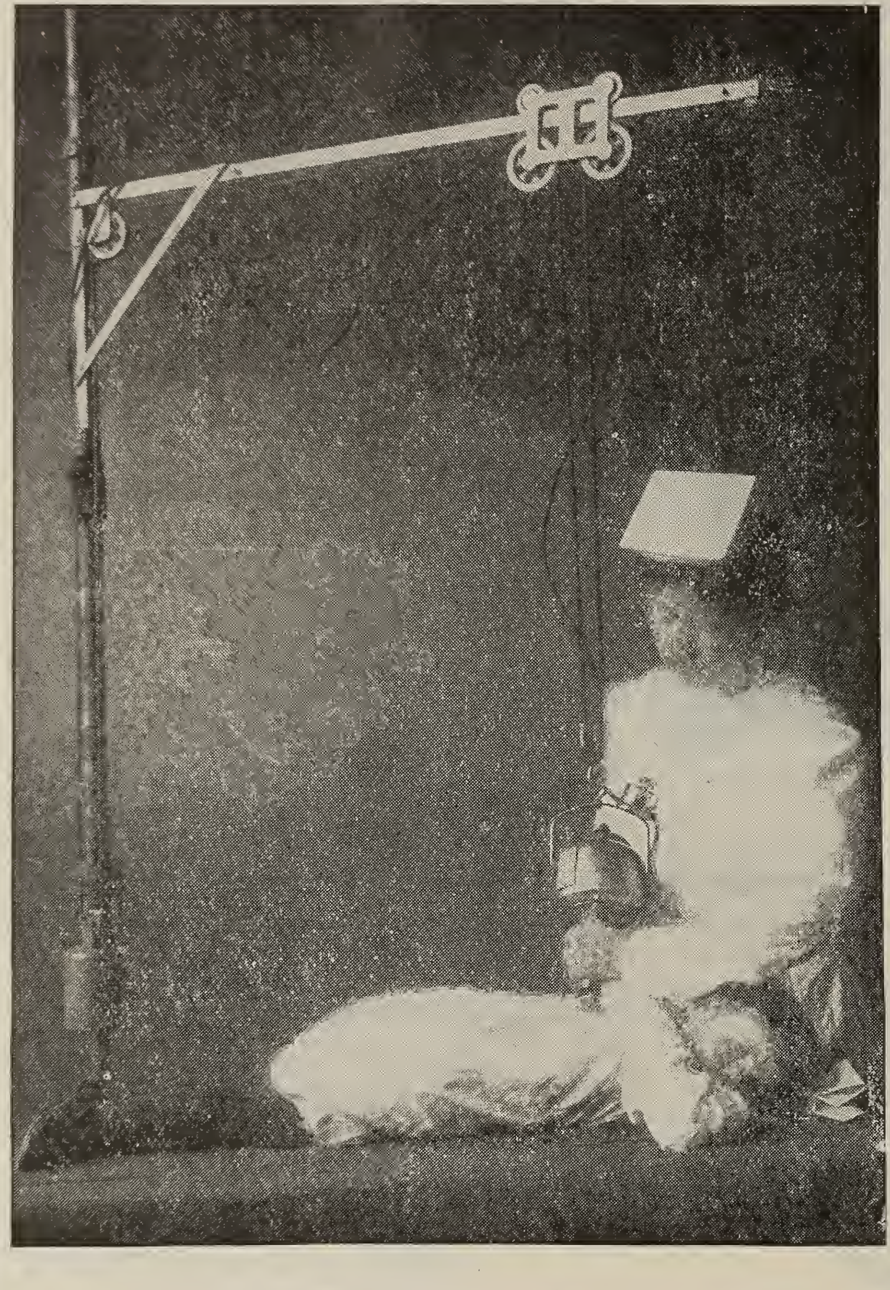

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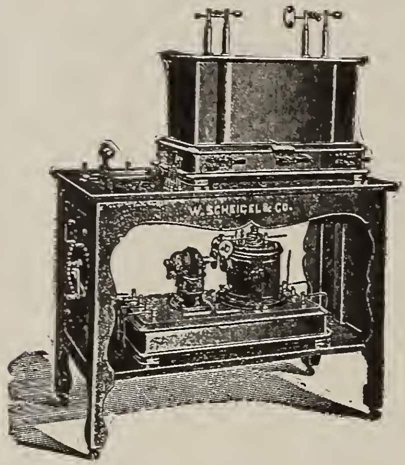
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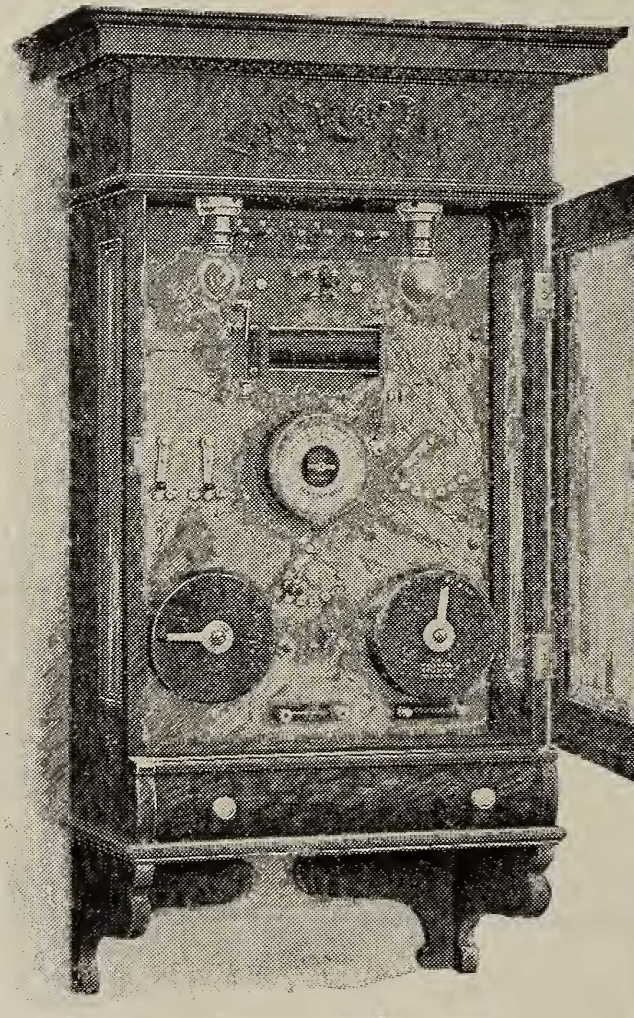

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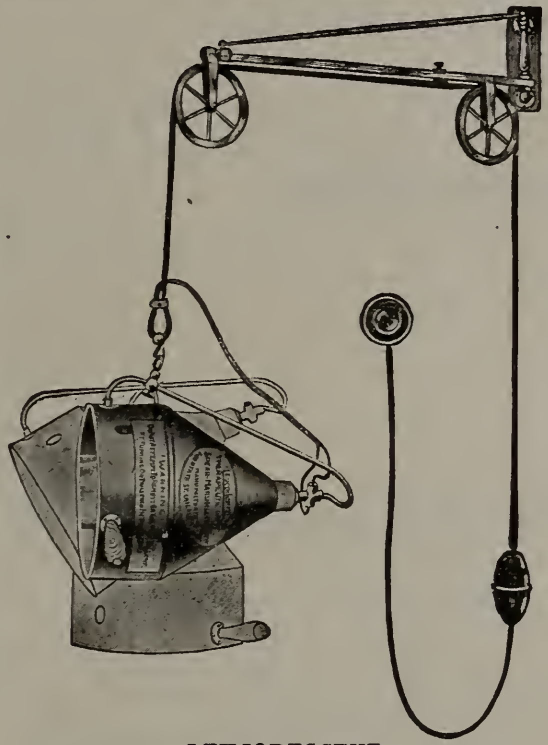

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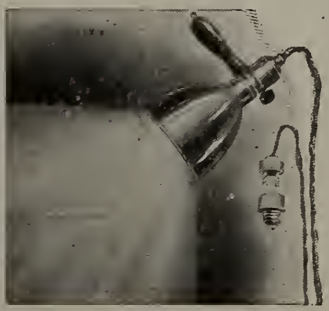

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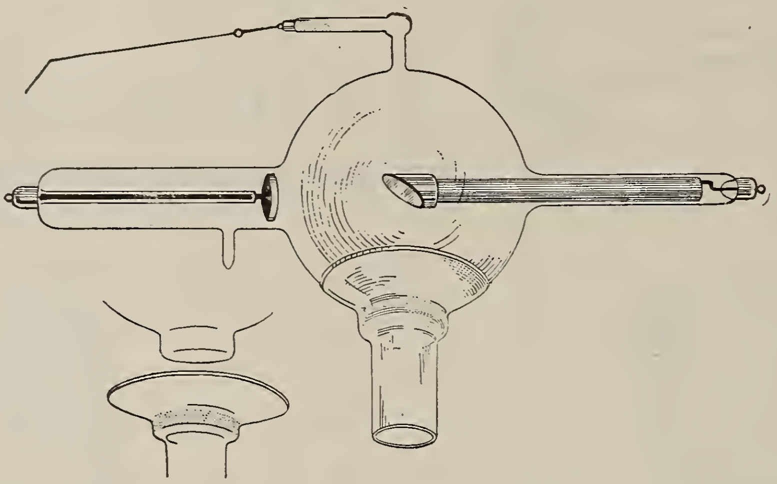

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VOLUME IV OCTOBER, 1906 NUMBER IV

SIGNIFICANCE OF PULSE AND TEMPERATURE IN THE DIAGNOSIS AND TREATMENT OF PULMONARY TUBERCULOSIS

BY JOHN E. WHITE, M. D., OF COLORADO SPRINGS, COLORADO
Medical Director Nordrach Ranch Sanatorium

ALTHOUGH the members of the profession at large pay but little attention to either pulse or temperature in the treatment of pulmonary tuberculosis, yet observation of these phenomena is of great importance. One of the earliest symptoms of the disease is the rapid pulse rate, and when a pulse rate above 100 is found it should be regarded with suspicion. When the disease is active, or progressive, a most constant symptom is temperature. It is not necessary for us to discuss the various theories as to the cause of this temperature; suffice to say that it exists, and is our best guide in treatment and prognosis. By careful observation of the temperature, we learn much as to the virulency of the disease; if it is under 100.4 degrees Fahrenheit, we know that the trouble is only moderately active, and that the open-air life and nourishment will do much toward effecting an arrest and establishing a cure. As the temperature rises above 100.4 degrees Fahrenheit, the disease becomes more virulent, with lessened chances of our finally extinguishing the fire that produces the temperature. In every active case temperature presents itself at the same time each day, with almost clock-like regularity.

A temperature record is valueless unless the observations are taken regularly and at the same time each day. If we are to learn anything by comparison, the individual with a temperature must live under the same daily conditions, invariably those of quiet and rest in the open air. From a high temperature to-day, produced by fatigue, and from the opposite to-morrow, produced by rest, we can learn absolutely nothing as to improvement.

In ordinary tuberculosis, we rarely find excessive temperature in the morning; it is usually subnormal at this time. From 12 m. to 2 p.m., and possibly as early as 11 a.m., the temperature begins to rise, reaching its highest point at either 3 or 8 p.m., after which it drops and disappears in the night. If the drop is sudden from a high point, sweating is the rule, although rarely present while the patient follows the open-air treatment. In miliary tuberculosis, the most virulent form of the disease, we find a morning temperature, which shows that the temperature is continuous, and the condition soon destroys the patient.

If the daily temperature is above 101 degrees Fahrenheit, it is usually ushered in by a chill, which may range from a slight chilly sensation to a pronounced rigor. Chills, as well as night sweats, are markedly benefitted by the open-air life. We find them frequently in practice, but seldom in sanatoria.

The temperature is about the same each day at the same hour, and again we would emphasize the fact that it must be taken regularly. As to the taking of temperature, there is but one true, scientific method, and that is *per* rectum. We frequently find patients, when sitting in the open air (especially in winter) with marked subnormal temperatures *per* mouth, produced by cooling of the cheeks; and if the patient happens to be a mouth-breather, the temperature will be very much below normal. If the mouth is used for the purpose of taking the temperature, it should be kept closed and warmed up for 10 minutes prior to taking the thermometer, which should remain therein for at least five minutes. Even with these precautions, we find that, while the temperature is normal *per* mouth, it may be 99.6 degrees or even 100 degrees *per* rectum.

No temperature is so slight as to be insignificant. While 99.5 degrees is but little, usually lasting only a third of the 24 hours, it is not to be ignored, for it is in the incipient cases that this temperature is to be found, and the best records of lasting cures are made in this stage. Slight temperatures show a tendency to become higher and more difficult to handle.

If the rectal temperature shows slight elevations we must use that method. If temperature exists, both mental and physical rest are imperative. If temperature is not present, exercise is demanded, and is gradually increased under medical supervision. The thermometer must decide which course of treatment is needed. If the temperature is watched very carefully and handled according to present day knowledge, it can (if not too high) be reduced to the normal, which will show that the disease has been arrested or brought to a standstill, *i. e.*, that new tubercles are not forming. After the disease has been arrested, as shown by this normal temperature, the patient has accomplished much, possibly over one-half of his cure, if a complete cure is to be reasonably expected.

After at least 30 days' normal temperature, the treatment changes from one of rest to one of exercise. Too much exercise at this point, however, will produce fatigue, and fatigue, by materially interfering with drainage, produces temperature. The drainage of pus from the lung is always more profuse while at rest, and that is the reason why rest has such a beneficial effect upon temperature. The patient must be watched very carefully when exercise begins, to avoid fatigue. I have seen patients overstep their instructions as to distance in walking, and produce, by fatigue, high temperature, necessitating a return to complete rest for many weeks, to overcome their indiscretion.

It is a very true saying (often uttered by Bridge of California), that many a consumptive starts out on a pleasure trip an extremely curable case, and returns incurable! One of our patients at the Nordrach Ranch recently took a 30 mile drive with some friends who happened to be passing through the city. He had received our very decided advice to the contrary. This patient was an incipient case, had done remarkably well for three months, had had no temperature for 60 days, had gained 15 pounds in weight, and everything pointed to an early recovery. The night after his drive, he had a temperature of 103 degrees Fahrenheit, and for three weeks following he had a temperature in excess of 102 degrees Fahrenheit with even a morning temperature of 101 degrees. This one pleasure trip came very near costing this young man his life. Fortunately, however, by placing him in bed at complete rest, and keeping all company from him, we were finally able to bring the temperature to the normal again; but he has nowhere near the chance of complete recovery that he had before taking this trip.

This instance is by no means rare. It is one thing to advise, and quite another to make patients do what you want them to; however, we have a far better chance of securing compliance with our advice in sanatoria than in general practice. When I see patients drifting with no one to supervise their actions and guide them according to their temperature requirements, I wonder how it happens that any one recovers in private practice.

The question of exercise is one of the most important with which we have to deal in the treatment of pulmonary tuberculosis. The patient himself can never be depended upon to use judgment. He will invariably overstep his requirements. No one is more able to handle this most dangerous treatment than the physician, and it had better be in a sanatorium. How often we hear the advice, "Go West and rough it. Ride horseback. Climb the mountains, etc." It sounds well to a boy or a girl, but produces more deaths in Colorado than all other factors combined.

It is time that the profession realized the great mistake of allowing tubercular patients to drift, especially if they have a temperature. A few recover, but the majority die while gaining their experience. A consumptive is a seriously sick individual, his temperature indicates as much in the way of treatment as does that of a typhoid fever patient, and I am sure that the greatest ignoramus in the profession would not send a typhoid fever patient, with a temperature of from 101 degrees to 103 degrees Fahrenheit to Colorado to ride horseback; and still it is common practice for some very prominent men to do the former in private practice.

In comparing a carefully kept temperature record with a physical examination, we find that, of the two, the record is the more valuable. A physical examination tells us practically nothing, it simply locates the trouble, in which lung it is and its approximate extent, *i. e.*, it tells us what has already been destroyed —

but does it tell us what is likely to happen, how much more destruction will take place, or that a cure or an arrest is possible? No, it does not. A physical examination is very unsatisfactory and cannot be compared to a pair of scales and a thermometer. I would not do away with physical examinations but would place the thermometer first in importance, for with it we can make a fairly accurate prognosis and outline the proper treatment, neither of which we could do from a physical examination. Patients, however, invariably want physical examinations, they seem to have a mania for them, and pay no attention to temperature.

We have seen many curable incipient cases die for the want of the true appreciation of the value of temperature at the right time, and still they had many physical examinations. It is of no special value to know the location and extent of the disease, unless they give us some insight into the prognosis. The thermometer gives us this desired information but a physical examination does not. In practice a temperature record is not often appreciated, and if it is appreciated it cannot be taken under exactly the same conditions each day; there are many factors, such as fatigue, excitement, joy, sorrow, music, and a thousand other things, which influence it. For this reason, the modern open-air sanatorium is more successful, for here the value of temperature is understood and the patients lead practically the same life of quiet each day.

As another illustration of the value of the temperature record, *versus* the physical examination, let us consider miliary tuberculosis. The physical findings are few, the tubercles are not rupturing to any extent and as air enters the vesicles we find but few crepitant *rales*, and as the tubercles may be scattered and present in both lungs percussion will tell us but little, while a thermometer tells us that we have a very high temperature, that the disease is extremely active; in other words, we are enabled to make a very grave prognosis, while the physical findings would lead us to class miliary tuberculosis among the incipient curable cases! I believe that most sanatorium physicians will agree with me in the foregoing statements, although many older practitioners might take exceptions. The eminent English authority, Burton Fanning, in his latest work, depreciates the physical examination as compared with the temperature record.

The pulse record is second only to temperature. The pulse rate may remain high for many months after the temperature has become normal, and if extremely high, may make it necessary to enforce rest even after the temperature has been normal for some time, although we find that the pulse rate generally increases after a patient is admitted to a sanatorium, which Burton Fanning thinks is due to the taking of larger quantities of food, especially of liquid food. This fact calls for the exercise of considerable judgment on the part of the physician as regards making the proper distinction between a high pulse rate produced by forced feeding and that produced by heart weakness. Therefore, in a sanatorium, some of our best patients sometimes carry the highest pulse rate. Exercise often reduces the pulse rate by strengthening the heart's action, and we often find it lowering after exercise begins. I have repeatedly seen a pulse rate lowered by moderate exercise; however, if the pulse rate is extremely high, 140, 150 or 160, exercise might prove detrimental.

Temperature and pulse are very greatly influenced for the better by the open-air life, especially sleeping in a tent. We also notice how much better the temperature and pulse are during cold weather if one is living out of doors. In cold air we have a most valuable aid in combatting temperature and reducing the pulse rate; but still the advice prevails to go to a warm climate; winter and a cold, dry climate are a great deal more curative. If the patient is passing through the summer, he should always seek the coolest place and avoid direct sunlight, as sitting in it will invariably bring the temperature higher. The so called "sun bath" we have proven to our entire satisfaction to be detrimental. We have repeatedly taken the temperature before and after patients have been placed in the sun, and we have almost invariably found the temperature to be higher.

In incipient tuberculosis, especially if it is very incipient, the physical findings are always very doubtful, and here again the pulse and temperature are very valuable in pointing out what disease might be present.

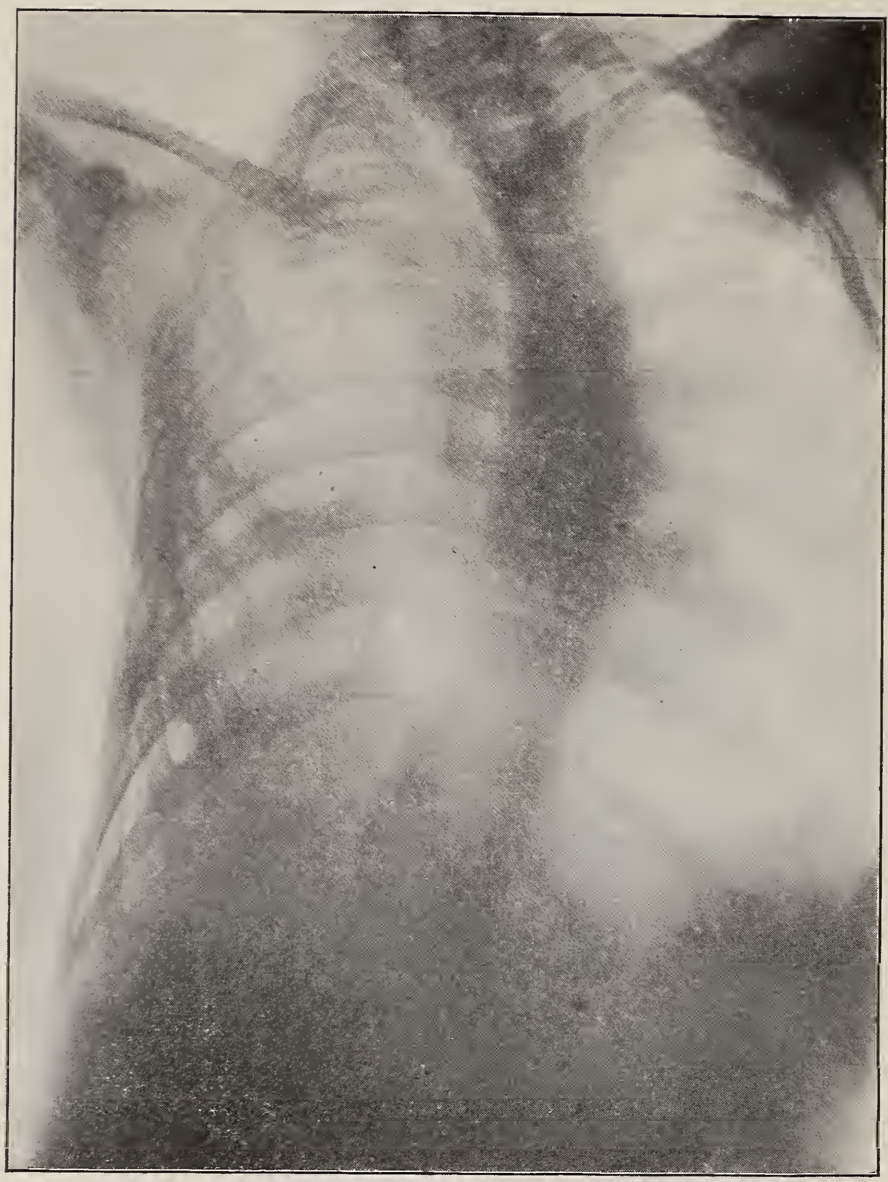
Dr. Osler says, "Put flesh upon a consumptive, and the local condition can be left to itself." But this flesh, even though it is crowded far above normal, is of no avail unless we can reduce the temperature. The gaining of flesh by the proper kind and quantity of food, taken together with a good temperature record, do constitute our true way of telling how a patient is progressing; in other words, a pair of scales and a thermometer tell the tale.

Occasionally we find cases recovering but not gaining in weight, in spite of forced feeding; but we never find one recovering with a temperature.

Much stress is placed upon cough and expectoration, with the various side issues, by some of the profession. The temperature, in the majority of cases, is ignored and made light of, while the fact is that it is the factor of primary importance and the side issues gather around it, depending largely upon it and clearing up with it.

SPECIAL NOTICE

This number of THE ARCHIVES OF PHYSIOLOGICAL THERAPY will reach a great many who now see it for the first time. If you are one of these, and are interested, don't you think it would be a good plan to send $1.00 to the publisher TO-DAY and have the magazine sent you regularly until January 1908? That's less than eight cents a month.



SPECIAL PLATE LXVII

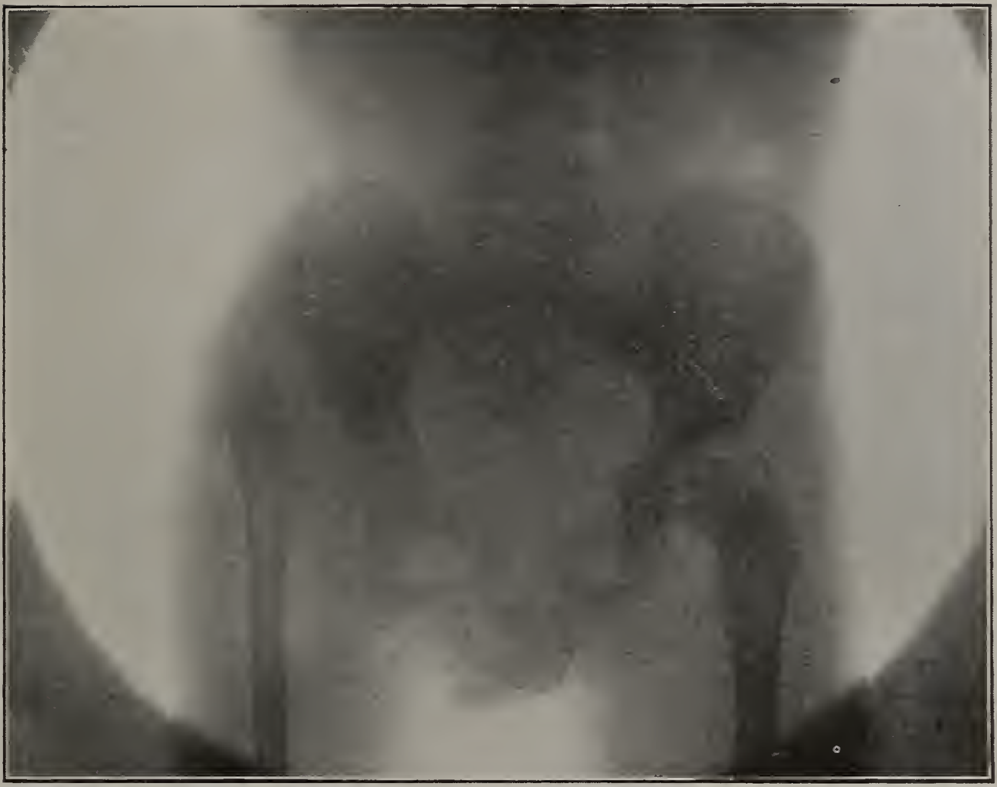
NECROSIS OF THE RIB

By Preston M. Hickey, of Detroit, Michigan

This patient, a boy eleven years of age, was operated upon for an empyæmia of the right side three years ago.

The necrosis is indicated by a semi-circular indentation in the sixth rib and was produced by the pressure of the drainage tube. Discharge is still present.

On the right is a general shading produced by the thickened pleura. The lateral spinal curvature to the right permits the differentiation of the sternum which shows the six centers of development.



SPECIAL PLATE LXVIII

TUBERCULOSIS OF THE HEAD OF THE LEFT FEMUR WITH DISLOCATION

By Preston M. Hickey, of Detroit, Michigan

Patient was a boy four and one-half years old who was born with a dislocation of the left hip, which was successfully operated upon by the Lorenz method when he was two and one-half years of age. Complete recovery of gait ensued and persisted until one month ago, when he suddenly developed pain in the left hip, and lameness. The roentgenograph demonstrated this to be due to the tuberculosis and dislocation therein shown.

UNIVERSAL METHOD FOR USING DIRECT ELECTRIC CURRENTS

BY WILLIAM J. HERDMAN M. D., LL. D., OF ANN ARBOR, MICHIGAN

THE wide range and value of the direct electric current is soon made evident to all who have it at hand as a therapeutic resource and who have mastered its technique.

The use of this valuable agent would, I am sure, be more general on the part of both physicians and surgeons if it could be rendered more readily available, its control simplified, and the apparatus for its measurement made more exact and identical in form for all sources of current supply.

The effect of a like pressure and quantity of a direct current is the same no matter what the source from which it is derived. If then we had an arrangement of apparatus that was the same for any source of current it would obviously be of great advantage.

In therapeutic practice the direct current is at present derived from primary batteries, usually connected in series, or from dynamos. The current from direct current dynamos for street and house lighting is usually maintained on the mains at a pressure of 110 or 220 volts; that used for running the motors of the street and interurban cars is usually maintained at a maximum pressure of 500 volts. Any one of these sources of direct current can be utilized for therapeutic purposes and can be controlled by a simple yet exact method.

The arrangement of the apparatus shown in the figure is as follows: A and B are binding-posts for the wires connecting the instrument with the source of direct current, which source may be as has been said, primary batteries, secondary batteries, or a dynamo circuit of 110, 220, or 500 volts; C is the cut-out, or switch, by turning which the current is admitted into or shut out from the board; F is a graphite rheostat connected *in series* in the main circuit and *in shunt* for the patient's circuit; D and E are a voltmeter and a milliamperemeter, respectively, so connected as to give the reading of electromotive force and current on the patient's circuit, no matter in which direction the current is travelling; G is a pole changer, which indicates also the direction of the current; H and I are the binding-posts for the connections to the electrodes, or, in other words, the binding-posts for the patient's circuit; L, L,′ L,″ L,‴ and L,⁗ are lamps, or places for lamps, to be used, if needed, when the source of current is such as to require more or less resistance to modify it for electrotherapeutic use.

Leclanche or Dry Cells

Let us assume that we have for a source of current fifty or seventy Leclanche cells or dry cells. The voltage of these will be 1.4 per cell, or, when coupled in series, from 70 to 100 volts for the series. None of the lamps need be used in this case, but the connections may be made directly from the binding-posts to the switch and the graphite rheostat. The direct resistance of the rheostat is 10,000 ohms, so that, when the switch is closed and the battery of cells is delivering its current through the rheostat, the resistance in the circuit is high enough to prevent a short circuit and a rapid waste in the cells. The resistance in the patient's circuit, which is in shunt with the main circuit, may be made much less than 10,000 ohms by moving the movable radius of the rheostat, which is a part of the patient's circuit, and thus the amount of current given to the patient can be varied at will.

Dynamo Circuit 110 *Volts*

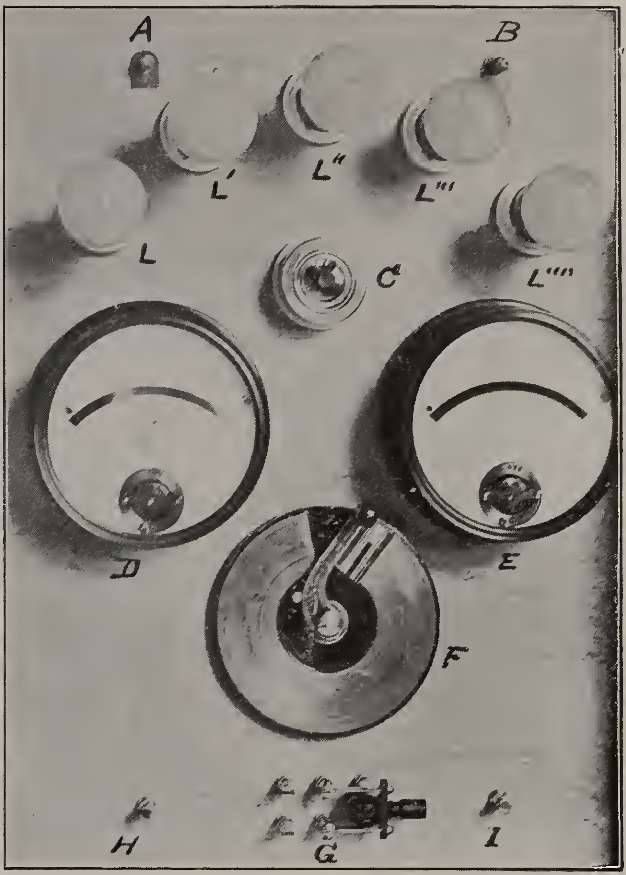
Should the source of current be the 110-volt dynamo circuit lamp L″ can be connected in shunt with the rheostat and thus divide the current with the rheostat and at the same time light the board. The lamp is a convenient indicator for the presence of the current on the board.

Dynamo Circuit 220 *Volts*

Should the source of current be the 220-volt circuit, the wiring from the upper binding-posts should include lamp L″ in shunt as before, and another lamp in series, as L′; or both lamp L′ and lamp L‴ could be connected in series with the rheostat and thus light the board symmetrically, provided the two latter lamps used are but one-half the voltage of the lamp used in shunt at L.″

Dynamo Circuit 500 *Volts*

Should the source of current be the 500-volt circuit usually employed for trolley cars or for supplying power, a form of dynamo that would in most instances be most convenient for physicians' use, then lamp L″ could still be connected in shunt with the rheostat and lamps L, L,′ L,‴ and L⁗ connected in series. This would cause a drop of potential sufficient to make a safe current and voltage for the patient's circuit.



Thus it is seen that the use of this arrangement of appliances requires only a little change in the preliminary wiring of the board for any one of the sources of current mentioned. After this is done, the action of the remaining parts is the same for all. The board is thus adapted for all these and many other sources of current, and permits of uniformity in the control and measurement of direct currents for therapeutic use where now there is great diversity.

This arrangement for controlling direct currents possesses also two notable advantages that should be especially mentioned as they are very essential to a successful direct-current technique. The shunt rheostat of graphite, which is of very high resistance, permits a very gradual admission of the current into the patient's circuit when it is closed for the treatment, and a very gradual withdrawal of the current when the treatment is ended. In dealing with sensitive patients, this feature is one of great advantage. Again, the pole-changer in the patient's circuit, which enables the operator to reverse the current direction through the patient without disturbing the position of the electrodes or modifying the arrangement in any other particular, meets the demand in making tests for diagnosis and adds much to the accuracy of the result. The care with which the current is reversed and measured is likewise very helpful in treatments by electrolysis in which a reversal of the polarity and, at the same time, a knowledge of the current-strength are often needed. A simultaneous record of the electromotive force and of the current enables the operator to determine at any moment, by the product of these two amounts, the number of watts that are being expended in the treatment, and the additional record of the time during which the current flows will furnish the means for determining the exact amount of energy to which the tissues have been subjected by each treatment.

RHYTHM AS A FACTOR IN THE DOMAIN OF THERAPEUTICS

BY SAMUEL S. WALLIAN, A.M., M.D., OF NEW YORK CITY

THE optimist asserts and the pessimist denies that the age is progressive. Let us discuss the evidences of medical progress.

As a profession our lay critics taunt us with lagging behind all the other learned professions. They charge that we impugn science by demanding unreasonable reiterations of evidence before admitting demonstrated facts. A modicum of these disparagements is unquestionably deserved.

Hippocrates was a conservative by both instinct and training, and his disciples have treasured his spirit with fairly religious assiduity. Nevertheless the art of medicine steadily if not rapidly advances. Contrast the trend of medical thought of today with that of even one generation ago. Then, Headland's "The Action of Remedies," as a prize essay, was acclaimed the high-water mark of medical advance. Today a "System of Physiologic Therapeutics" fills eleven volumes, comprising between four and five thousand pages, compiled and written by a dozen eminent authors and editors of international fame, and containing scarcely a single reference to drugs or chemicals of any kind. The former was an insignificant octavo of a few hundred pages, and viewed from our present vantage ground was a narrow analysis of the alleged and apparent influences on the human organism of a few hundred "standard" drugs and chemicals. On the other hand the latter work includes among its topics, Electrotherapy, Climatology, Health Resorts, Prophylaxis, Hygiene, Dietetics, Rest, Mental Therapeutics, Suggestion, Hydrotherapy, Phototherapy, Mineral Waters, Baths, Pneumatotherapy, Mechanotherapy, etc.

Among all these perhaps the most marked progress has been made in the wide and as yet only partially explored field of Mechanotherapy.

At the outset of any analytical inquiry we are met by the fact that the study of the electric current, with its myriads of possible modifications, has recently passed through a stage of evolution that almost amounts to revolution. All this progress belongs to the realm of mechanotherapy, since electricity, it is now conceded, is but a modality of motion.

A generation back a majority of the profession looked askance at the work, and flatly disputed the claims of the experimenters with galvanism and the faradic coil. Such was their incredulity that for the most part the use of these then-considered uncanny agencies, was left in the hands of unscientific and unscrupulous charlatans and sensational pretenders. Now this form of energy is being developed into a most fascinating science, and its devotees are evolving modalities heretofore undreamed of—induced, intensified, shunted, and deflected, until the experts feel quite warranted in undertaking to accomplish the impossible, and to make aforetime miracles seem commonplace and simple sequences.

These new currents or transformations of currents are made to yield every known form of physical, chemical and vital manifestation, and have consequently upset all the previously settled laws governing matter, motion permeability and penetrability. Once this mysterious force was held in check by glass, rubber, dry air, silk, and the other reputed non-conductors. These later modalities refuse to be barred or seriously interrupted by the best of these substances, and they easily and brilliantly illuminate bodies and materials that before were impermeable to the intensest rays of either natural or artificial light.

We have at last learned that the particular manifestation of any desired or evolved current depends entirely on its rhythm, that is, its velocity or frequency of reiteration. Any given rate or rhythm produces its own proper bar or line of the prismatic spectrum, and this is varied much more than is indicated by the range of visual limitations, in other words, from a hypothetical zero, somewhere below the red, to another hypothetic extreme or maximum, somewhere above the violet, and running through the entire gamut of physical phenomena, from heat to chemism and radiant emanation, and from momentum that is transformed into an intensity of incandescence which makes the light of the sun seem pale, to music evolved by combinations of currents, alternators and tone-blenders, as has been at last realized in Cahill's "Telharmonium."

In this latter achievement one of Bellamy's dreams has received its baptism of reality. Furthermore, it is an added corroboration that the visible universe is but a material expression of rhythm.

Health is vital rhythm.

Disease is vital discord.

Death is the cessation of vital consonance.

These three definitions simplify the study of physics, physiology and philosophy. Accepting them we must go further, and classify the solar system as a material embodiment of rhythmic reiteration, a diapason of harmonic, incessant and concordant energy.

The scientist now asks, What are chemical action and reaction if not forms of energy, manifested by vibratory change and interchange? Elemental corpuscles brought into intimate contact, in a suitable medium, attract and antagonize, bombard each other, rotate in rhythmically symmetric and concurrent cycles, that intersect and inosculate, until, through mutual decomposition and recomposition, intercorpuscular equilibrium and a new compound result.

This force, which is never made manifest and visible except through vibratory impulse, is all-pervading and universal. It is so cosmopolitan in the realm of science that no form of remedial agency can be dissociated from it. Moreover, since recuperatory effort is in all cases an attempt to restore vibratory or rhythmic equilibrium, the more intimately and accurately therapeutic measures of every kind align themselves with this law of rhythmic reiteration, which has proved itself to be so fundamental to all force, motion and life, the more efficient they become.

It does no violence to either the logic of science or the laws of physiology to assume that mechanical vibratory impulses can be exhibited in such a manner as to instigate, simulate and stimulate vital vibrations, found temporarily interrupted or in discord. If the mechanical manipulations invoked be competent in character and thoroughly adjusted to the individual conditions in each case, the process may be not inaptly termed mechanovital, and results that are both legitimate and satisfactory may be confidently anticipated. It is not, however, a question of plausibility or mere probability, it resolves itself into a question of actual test, of positive accomplishment, of adaptability and availability. It is a question of appealing to artificial, physical or mechanical means for the purpose of inciting, accelerating, supplementing or substituting vital impulse.

In corroboration of this assumption a few established and universally accepted physiologic postulates may be cited:

1. Mechanical stimulation of a nerve when applied with sufficient rapidity produces a change in the form of the nerve particles.

2. If a mechanical stimulus be applied to a nerve very gradually it will render the nerve inexcitable, without its manifesting any signs of being stimulated.

3. Mechanical stimulation of a nerve does not cause it to become acid as do other forms of stimulation.

4. It is found that the mechanical work executed by an excited muscle as the result of mechanical stimulation is *one hundred times greater than the energy expended by the mechanical stimulant.*

It is not difficult to determine the bearings of these authoritatively established facts in physiology and neurology. Their number might be multiplied almost indefinitely, and it would seem impossible to deny that they provide a broad basis on which to erect a positive and promising therapeutic system, with mechanorhythmic vibration as its fundamental basis.

LATE RESULTS OF ROENTGENIZATION IN EPITHELIOMA*

BY WILLIAM L. BROSIUS, M. D., OF GALLATIN, MISSOURI

IN December, 1904, I reported to the Grand River Medical Society, which met at Brookfield, the results in three cases of epithelioma which were well in 50 to 60 days after beginning roentgenization. The lip case has now been well for three years, the nose and forehead cases for over two years, and I want to report a case of sarcoma — postoperative — which was treated during the summer of 1904 and remains well. These results I believe warrant us in inquiring into the remote effects of the Roentgen rays.

At that time I said "We know the effect upon bacteria in culture; mild radiation will stimulate their growth while longer exposure will inhibit and finally arrest their development.

"Secondly, we know that short exposure at a proper distance upon normal tissue will stimulate physiologic action, and that with a longer exposure or a lower vacuum at closer range, we can destroy the same.

"Thirdly, we can influence in similar manner abnormal tissue.

"Now pathologic tissue being of lower vitality than physiologic, we can so learn our individual subjects, so regulate our vacuum, distance, time and frequency of exposures, as to cause, in most cases, a destruction of abnormal tissue only, and at the same time so stimulate normal repair as to see pathologic tissue melt away without sloughing, and new, almost normal tissue take its place."

Since writing the above, we have learned that primary cell life is very markedly affected by the emanations from a Crooke's tube. The spermatazoa have disappeared from the seminal fluid of many operators who have carelessly exposed themselves to this form of energy. The ovum fails to proliferate after exposure to this peculiar light.

We know that organized life, vegetable or animal, and all growth, physiologic and pathologic, is the result of the proliferation of one original cell, or the division of one cell into two or more.

We also know that malignant growth is the result of the abnormal proliferation of cells, embryonic in character, often foreign to the structures in which they are found, and exhibiting a tendency toward degeneration. Now if this be true, and the truth is self-evident, then any influence, chemical or mechanical, which will deprive the cell of its power to procreate will inhibit the growth, and the influence which will deprive the cell of its life will result in the disintegration of the growth.

This energy we have in the Roentgen rays. Capable of causing cellular death, not only of the cells organized or aggregated into a growth, but of outlying cells which are ready to become a part of the palpable growth, or to form a nucleus for an extension or metastasis of the same. The death accomplished, a phagocytosis is set up which soon results in the disintegration and casting off, or in the absorption of the growth.

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*Read at fourteenth annual session of North Missouri Medical Association, Moberly, Mo., June 21 and 22, 1906.

Since we have in the Roentgen rays this means of causing the death and removal of abnormal deposits of depraved cells, without any material damage to normal structures, is it not reasonable for us to conclude that we have so sterilized the field that immunity will be the result? In fact such appears to be the effect where the work has been carefully and thoroughly done. And time enough has now elapsed in many cases for us to say that results are permanent.

We were gratified with the immediate results in these malignant growths, and as the years go by we are delighted to note no evidence of return. So we conclude that the ultimate effects of the X-rays in epithelioma have so far been very satisfactory.

PHYSICOTHERAPY AND PHYSIOTHERAPY*

BY DR. J. A. RIVIERE, OF PARIS, FRANCE

ARE the two words "Physicotherapy" and "Physiotherapy" synonyms, or do they designate two different classes of ideas?

In spite of our feeble linguistic pretensions, we are sufficiently at our ease with the word "Physicotherapy" since we invented it and caused it to live, by popularizing it and conferring upon it an acceptation perfectly definite in medical science. (See *Annales de Physicotherapie.*)

Physicotherapy is the curative method based on the combined employment of physical agencies; these agencies are applied in their natural state (air, water, light, etc.), or rather, domesticated in a medical establishment furnished with apparatus planned and grouped for successive or synergic applications, extremely numerous.

Physiotherapy is an etymological term much more extended, so extended that it is vague. It is the putting in operation of natural medicine, or naturism. Therefore all its curative agents are natural agents. Physiotherapy implies the use of ipecac and senna, as well as all physiological treatment.

That which characterizes our physicotherapic method is the proper combination which we make of our multiple apparatus in the treatment of chronic diseases. As for that, we arrange a complete gamut of apparatus permitting the utilization of all physical agents under their most complex and varied forms.

In our rational therapeutics we hold to the consideration of the sick person before the sickness, and the constitutional condition before the symptom.

The ceremony of diagnosis serves most frequently only to indicate the dominant symptoms. Our idea is that disease never manifests itself except when the human machine is foul. Self-poisoning releases human toxins before it releases microbian toxins.

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*Read at the Fifteenth International Medical Congress, at Lisbon, Portugal, April 19-26, 1906

Beside these self-poisonings there are also those which spring from a lack of utilization of nutritive materials absorbed in too great abundance.

In disturbances of the economy, two principal causes are recognized: the surrounding influences (moral or physical) which act through the medium of the nervous system, and the infections of all sorts, alimentary and others, which seize upon the humors.

This general conception reconciles the materialists and the ancient humoralists.

Physicotherapy, by its multiple agents, at the same time that it stimulates and corrects the nervous function, purifies the entire organism, one of the points of concentration of influence.

Our method consists in a large use of electricity, of water, heat, light, and of movement to increase the activity of oxidation, to favor changes and eliminations of all sorts, and to increase the vital energies after having given a good direction to the nervous system.

It is preventive and curative. We say, as we always have said, that the functional disturbance precedes the lesion. The nerve cell, most resistant, is the last to be altered and to be restored.

The expectant treatment which, in acute diseases, thanks to lack of appetite and to the water regimen, allows the sick person to free himself from his poisons, is insufficient for chronic cases, which have need of powerful assistance to aid in correcting their functional irregularities.

Physicotherapy is the best method for assisting, by a complete and graded system of apparatus, of multiple resources borrowed from physics, the natural relief which physiatrics joined to pharmacotherapy is often powerless to secure.

In other words the field of physicotherapy is much better delimited than that of physiotherapy; its actions well comprehended are directors and never disturbers of the vital force. It excludes violence and seeks equilibrium by relying principally upon the harmonious regulation of the nerve-force and the righting of the nutritive function, more or less diverted into various morbid states. Physicotherapy harmonizes the nutrition of the cellular elements of our tissues, rectifies the nerve-force and opposes malnutritive conditions by means alone of these natural forces:

1. Water (hydrotherapy, balneotherapy, steam).
2. Movement (kinesitherapy, orthopedia, massage).
3. Electricity (in its various forms).
4. Light (phototherapy, radio and actinotherapy).
5. Heat (thermotherapy).
6. Air (aero and pneumotherapy, etc.).

These six agents (there are not seven of them) can be combined (hydro-electrotherapy, hydro-massotherapy, hydro-thermo or sudotherapy, for example), or associated (gymnastics active and passive, electric vibrotherapy) to the great benefit of the sick. But it is necessary, in order to obtain all the possible curative results, not to be contented with vague physiotherapic aspirations. One must possess, carried in hand and ready for timely application, a hundred (I do not exaggerate at all) instrumentalities or processes, constituting the complete game of physicotherapeutics.

To sum up, our term "Physicotherapy" is more definite, better adapted to the scientific method which utilizes physical agents in medicine, than that which is almost its homonym, very much too broad, "Physiotherapy."

EDITORIAL

WHEN **The Archives** was started, nearly two years ago, the intention was to develop it along the lines of its greatest possible usefulness to the profession. This policy, which has been, is being, and will in the future be strictly adhered to, has led us, after mature consideration, to the conclusion that the abstractive departments of **The Archives** constitute its really important and useful reason for existence. All journals publish original articles but not one except **The Archives** abstracts, completely, exhaustively, and satisfactorily, the literature of the world concerning physiological therapy.

Original articles will therefore be omitted from the issues following that of December, 1906, and as such omission will greatly reduce the cost of producing the periodical, subscribers will be given the benefit of this reduction in cost by a reduction of the subscription price to $1.00 a year. A proper extension will be made in the subscriptions of all our present subscribers who have already paid for any portion of 1907.

As a special offer to both old and new subscribers we will send the November and December issues free to all those forwarding $1.00 for 1907 at once.

We have all of the original articles that we can possibly take care of during the rest of this year, hence would request intending contributors not to send in any more manuscript, at the same time extending our appreciative thanks for whatever favors they may have intended to extend to us in this direction. We desire also to extend our appreciative thanks to all of those who have contributed original articles in the past.

Through an error a wrong cut was printed in the September announcement of Green & Bauer. The proper cut appears in this issue.

A Short Summary of the Development of the Treatment of Uterine Fibromyomata, within the Last Twenty-five Years. (*F. W. N. Haultain, The British Medical Journal, August* 4, 1906.) The author records over one hundred consecutive successful cases of supra-vaginal hysterectomy and refers to electricity in the management of uterine fibroids as follows:

" Electrical treatment as propounded by Apostoli I cannot but feel has not had accorded to it the deference it deserves. This perhaps is due to the fact that surgical methods have made such progress as entirely to supersede it. From a large practical experience of this method I am convinced that a very considerable proportion of cases are not only temporarily benefited and thus tided over till the menopause, but also are completely cured. When the mortality from hysterectomy and other surgical procedures was over 25 per cent. it was a method of treatment to be strongly recommended, but now that surgical methods are performed with such freedom from danger to life, its uncertainty and tediousness place it in the background. Still there is a proportion of sufferers from fibromyomata who resent operative procedure if any other possible method of treatment is of avail, and it seems to me that there is no reason why they should not have the benefits of a trial of the electrical procedure if they so desire. No more outstanding proof of the value of electrical treatment can be found than the fact that Thomas Keith, who was the most successful hysterectomist of his time, discarded surgery for this method, although in 1883 he had successfully performed twenty-three hysterectomies with but three deaths. Why Apostoli's treatment has failed to be recognized as a standard method of treatment, and is now practically obsolete, is difficult to determine. Perhaps it is due to its uncertainty, and to the haphazard manner it has been recommended and used as a universal panacea, which seems to be the fate of all advances in medical electricity. But there is no doubt in my mind that it is denounced unfairly as dangerous and useless by many who have given it an insufficient trial, if any at all; while others seem to have a completely mistaken notion of its application.

" One is surprised, for instance, to read in Hirst's text-book a description by one who was a member of a committee of three appointed to investigate the treatment that a current of the strength of 40 milliamperes is enough. No wonder the results were negative; and when that is taken in association with the elaborate method of application, little wonder is to be expressed with the fact that the committee discarded it.

" A current of less than 80 milliamperes cannot be expected to have effect on a fibroid growth, if it be considered from a physiological aspect, and anything between that and 120 milliamperes may be given with the utmost safety. To ' unreservedly condemn ' electro-negative puncture, as the same author does, is also entirely opposed to my experience; but perhaps it has also been used in a similar unsatisfactory manner. I again repeat that Apostoli's treatment of fibroids is one of great value, and feel obliged to do so from the benefits I have achieved by its adoption. Even now, when surgical methods have attained the extraordinary success they can boast of, it offers to those whose timidity refuses to allow them to undergo the ordeal of the knife an alternative worthy of trial, which must be respected in a free country such as ours. It has also been denounced as not only dangerous, but militating against safe subsequent operation. This, again, I can only infer is the dictum of those who have either not used it at all or have done so in an imperfect manner.

" Out of more than 150 cases in which I have followed this method, both by electro-negative puncture and intrauterine positive treatment, I have never seen an untoward result, and in many of these in which I have subsequently had to operate no complications due to the previous electricity were observable."

The Electrical Resistance of the Blood and Urine as a Test of the Functional Efficiency of the Kidney. (*Dawson Turner, The British Medical Journal, July* 28, 1906.) During the last 10 years Turner has made various observations upon the specific resistance of urine with a view to ascertaining some method of utilizing this property in the diagnostic location of pathological processes in the kidney. His method consisted in placing the fluid to be investigated in a U-shaped electrolysis tube containing two disc-shaped platinum electrodes arranged so as just to rest upon the surface of the fluid, 21 c. cm. of which were used for each experiment. Measurements were made by Kohlrausch's method and at a temperature of 65° F.

It was found that the specific resistence of normal urine amounted to about 45 ohms, that this resistance is a measure of the salts, chlorides, phosphates, sulphates, etc., present in the urine, the greater the concentration the less the resistance and vice versa. In some diseases the resistance was found to be increased, especially in acute croupous pneumonia (because of the diminution in the chlorides), diabetes mellitus, acute and chronic Bright's disease, and pernicious anemia. As the glomeruli are mainly concerned in the excretion of salts from the urine a high electrical resistance would indicate an impairment of the function of the glomeruli, other things being equal.

Turner has also been attempting to determine the electrical resistance of the blood but has found it difficult to evolve a satisfactory technique. His best results were obtained by placing 5 c.cm. of freshly drawn blood between two cup-shaped electrodes 3 mm. in diameter, coated with spongy platinum and fixed at 0.75 mm. apart. The length of the cylinder of blood between the electrodes is of less importance than its diameter, because the cross-sectional area varies with the square of its diameter and the resistance of a conductor varies directly as its length and inversely as its cross-sectional area. By employing electrodes of a fixed diameter at the same distance apart and the same quantity of blood for each observation and by making the measurement before coagulation or evaporation could occur, fairly consistent results were obtained. The average specific resistance of normal blood measured in this way is 93.5 ohms, but it varies from 85 to 130 ohms according to the concentration of the blood.

" A striking change is to be observed in pernicious anemia, the resistance in this disease being usually about one-half (50 ohms) that of normal blood. The deduction is that the blood in this disease contains an abnormal amount of salts due either to destructive metabolism or to renal inefficiency, or to both. Light is thrown on this question by examining the resistance of the urine; this will be found to be abnormally high. Hence we have the striking fact that while the urine contains too few salts, the blood contains an abnormal amount. This, then, is a clear case of renal inefficiency.

" In view of this fact (impairment of the glomerular function of the kidney) the pathology and treatment of pernicious anemia require reconsideration. These results, obtained some years ago, and the introduction of cryoscopy, have led me to compare this method of determining the renal efficiency with that of cryoscopy, and to originate a ratio which I will call " The Hæmo-Renal Salt Index," namely:

$$\frac{\text{The Electrical resistance of the blood}}{\text{The Electrical resistance of the urine}}$$

" In health this would be equal to two or three whole numbers, for example:

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{93.5}{45} = 2.08.$$

" If this number increases it indicates that the blood contains fewer salts and the urine more, and that the functional activity of the kidney is increasing; if, however, the hæmo-renal salt index diminishes it indicates that the functional activity of the kidney is diminishing. Thus in a bad case of pernicious anæmia the hæmo-renal salt index is less than one, it is a fraction, but with an improvement of the patient it will at once increase, and with his recovery it will return to normal.

" The following are some illustrations:

1.—A. B.: Healthy:

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{119}{38.25} = 3.1 = \text{haemo-renal salt index.}$$

" 2.—M.: Advanced pernicious anæmia, a patient of Dr. G. Gibson, examined July, 1906:

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{40.8}{68} = 0.6.$$

" 3.—A. D.: Pernicious anæmia with many relapses, a patient of Dr. A. James, examined February, 1902:

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{51}{115} = 0.44 = \text{index.}$$

" 4.—A. B.: Secondary anæmia, patient of Dr. Gibson, examined July, 1906:

$$\frac{\text{R. of blood}}{\text{R. of urine}} = \frac{85}{56.1} = 1.5 = \text{index.}$$

" 5.—A. T.: Chronic rheumatism, patient of Dr. Gibson. Index 3.3.

" 6.—W.: Chronic interstitial Bright's, patient of Dr. Gibson. Index 2.1.

" 7.—H.: Recovery from pernicious anæmia; R.B.C. nearly 5 million. Patient of Dr. Gibson. Index 1.7.

" This method is more sensitive, more rapid, and more accurate than cryoscopy, but it does not measure exactly the same thing. Cryoscopy measures the total molecular concentration, and is independent of the kind of molecule, provided they are not dissociated (salts, acids, and bases are exceptions).

" Electrical resistance depends only upon the salts, acids, and bases, and of these sodium chloride is by far the most important; it is practically unaffected by the presence of albumen, sugar, and other non-electrolytes.

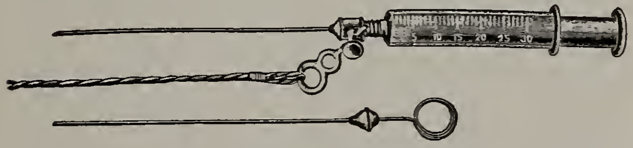
" Urea has a small effect only. The combination of cryoscopy with the determination of the hæmo-renal salt index would give us more precise information as to renal capacity than the use of either method alone; the one method should not be regarded as a substitute for the other, but rather as complementary to it, but of the two the electrical method is so much more convenient and rapid that it is likely to come into extended use in the future."

Pernicious Effects of Alternating Currents of High Voltage. (*Frederick H. Millener, American Medicine, August,* 1906.) Millener has spent some time in observing whether or not various electrical currents exercise an injurious influence upon persons, as employees, who are exposed to their action several hours of the day. He has come to the conclusion " that continued employment in the immediate presence of these great electric generators or transformers " results in disturbance of the " digestive fluids or of the secretions of the stomach and its cognate glands and organs so as greatly to impair the digestive function; and that persons so employed lose their appetite, and become of an almost chalky complexion, experience pain and distress after partaking of food, and often have to obtain short periods of vacation in order to recover their ability to eat and digest food in a normal manner." As matters of common experience which confirm his hypothesis that electrical conditions do materially affect human beings he cites the exhilaration felt by human beings, birds, animals and even insects just before an electrical storm. Children run and jump, young animals frisk and sport about, and birds dart through the air.

Another commonly observed fact is that milk frequently turns sour immediately after a thunder storm. In dairies where electrically excited separating machines are used they invariably employ the direct current because souring of the milk does not occur when this current is used but does occur very rapidly when the alternating current is used. If this last fact is confirmed it will be a very weighty bit of evidence in favor of Millener's contention.

The author has collected more than 20 cases in all of which the symptoms are the same, viz., deterioration of the vital organs of the individual and his power of assimilation of food, and the development of a chalky complexion. He considers the effects sufficient to warrant bringing the matter before the medical profession for investigation, as, if electric employees are injured, something should be done to discover the deleterious influence and to protect them therefrom.

Electrical Orientation in Spinal Anesthesia. (*J. Leonard Corning, New York Medical Journal, July* 21, 1906.) The use of the faradic current is of great assistance in spinal anæsthesia as it is possible by its use to ascertain when the point of the needle has pierced the membranes of the cord; most physicians consider that outflow of the cerebro-spinal fluid is the only reliable sign that this event has taken place, which is a mistake. Corning's apparatus consists of a slender, hollow needle five inches long provided at the point of attachment of the syringe with an eye and screw by which means the end of an insulated conducting cord may be secured. The other end of this cord is attached to one of the poles of a faradic battery.



Showing hollow needle with conducting cord and syringe attached; also stylet withdrawn.

A wire stylet for the hollow needle (see cut) is also provided. The shaft of the hollow needle is insulated throughout its entire length save only at the point, where about one thirty-second of an inch is left bare. This insulation is achieved by coating the hollow needle with shellac of fine quality, which offers but insignificant hindrance to the introduction of the instrument.

To render completion of the circuit possible a broad sponge is attached to the remaining pole of the battery by an insulated conducting cord and held against the abdomen by an elastic belt. As soon as the needle is introduced the electrical circuit is closed.

Two cases are reported of which one is quoted here because of its instructive character as regards the use of electricity in this situation.

"In the case of Mr. K., for long a sufferer from sciatica, all the usual means of treatment, both local and general, having been tried to no great purpose, I decided, during a particularly severe access of pain and stiffness, to make trial of spinal anæsthesia, invoking for purposes of orientation the procedure previously outlined.

"Placed in a sitting posture, his back bared, his body bent forward, I injected a little cocaine into the skin and subcutaneous tissue between the third and fourth lumbar vertebræ, employing for the purpose a solution of one half per cent. The broad sponge electrode, duly moistened, was then fastened over the abdomen, and the current turned on. Upon this, I proceeded with the introduction of the needle, in which I had previously inserted the stylet, thrusting in quite slowly as I neared the canal, till, having pierced the ligament and gone a little way beyond, Mr. K. exclaimed suddenly, 'I feel a pain in my leg and foot.' The further propulsion of the needle was immediately stopped and the current shut off. I had pierced the membranes, then, according to all foreseeing; but for a double assurance I withdrew the stylet, when suddenly out ran the cerebro-spinal fluid. The injection of the anæsthetic—fifteen minims of a three per cent. solution of cocaine — was then accomplished without incident; and anæsthesia, extending some distance above the point of injection and in other respects as perfect as I have ever been able to obtain, ensued within a few minutes. With its appearance came, of course, cessation of pain in the affected sciatic nerve, this immunity lasting, however, but a short time after the disappearance of the anæsthesia.

"I may add that the sudden pain in the leg and foot that caused the exclamation of Mr. K. could hardly have been due to pricking of the filaments of the cauda by the needle; for on shutting off the current the pain ceased immediately. Nor while there was no current did a further thrusting in of the needle give rise to painful sensations in the extremity; yet, when the current was allowed to circulate once more, the same painful sensations in the leg were again evoked. The point of the needle must, therefore, have slipped between the filaments of the cauda; and, save for the presence of the electric current, could have afforded no reliable signal of its exact position."

Considerations on a case of Alopecia Cured by Static Electricity. (*M. Suquet, Annales d'Electrobiologie, May,* 1906.) Report of an almost generalized case cured by 15 static applications after all kinds of antiseptic treatments had failed. Any other electrical modality would have been as successful, the writer thinks, and he concludes by saying that there are several different kinds of alopecia; some are of parasitic origin; but some are of trophoneurotic origin and these are happily influenced by any electrical modality that stimulates the nervous system, while antiseptic methods, efficient in cases of the first category, are naturally powerless here.

F. E. G.

The High Frequency Spark in the Treatment of Premature Alopecia. (*George M. MacKee, New York Medical Journal, July* 28, 1906.) For the purposes of the high frequency treatment of premature alopecia the author considers that the division of cases of this disease into two general forms will suffice, viz., a loss of hair due to systemic and neurotic disturbances, which include all cases of alopecia in which there is no evidence of the desquamative diseases and all grades of alopecia areata. Second, loss of hair due primarily to bacterial invasion which includes all cases presenting evidence of local disease except tinea, favus, etc., *i. e.,* pityriasis, seborrhœa sicca and seborrhœa oleosa.

The successful treatment of alopecia then depends upon the proper employment of (1) the use of parasiticides to destroy invading bacteria; (2) the employment of internal remedies and hygiene to improve the general health; (3) an improvement of the local circulation.

It is in the cases of long standing associated with impoverished circulation and vitality that MacKee has found electricity ordinarily useful. He first tried the use of local irritants such as ointments of corrosive sublimate, resorcin, salicylic acid, etc., but it was found that the hyperæmia produced was in most cases very transient, while in others blistering, scaling, and an undesirable congestion was the result. He then tried constriction of the circulation by applying a broad rubber band around the head above the ears and also the vacuum cup. Both these measures produced a congestion but this congestion was venous whereas what was desired was an increased volume of blood circulating through the capillaries rather than a venous stasis;

some benefit seemed to accrue, however. The high frequency spark was then employed with very satisfactory results and the author's experience with a large number of cases so treated has led him to recommend the following technique:

The unipolar discharge from any high frequency outfit may be used but he prefers the Piffard hyperstatic transformer because it may be actuated by either a static machine or a Ruhmkorff coil. The static machine is preferable as an excitant where a satisfactory hyperæmia is produced by a mild treatment; the treatment is also less disagreeable than when the coil is used and the undesirable heat effects are much less marked. With an eight or ten-plate static machine " running to full capacity " he recommends using a spark-gap of one inch; if the spark gap is much longer than this a heavy spark will result which is unpleasant to the patient and will not produce the desired result. If the hyperæmia is not easily induced, however, the coil should be used to excite the transformer and the spark gap reduced to from one-quarter to three-quarters of an inch. The desired effect is easily produced in less than half the time with a coil than with a static machine

The most important object of this treatment is the production of a hyperæmia and unless the treatment is of sufficient length and intensity to produce this result no benefit accrues. Two or three seances should be administered each week and the electrode should be kept in contact with the hair and moved so as to avoid the heat effect, which is sometimes strong enough to burn the hair if the electrode is allowed to remain stationary for several seconds. The ordinary glass vacuum electrode may be used but if this does not give sufficiently strong results a glass vacuum bulb lined with silver and filled with carbon will produce stronger effects.

The beneficial action of the high frequency spark in this condition is both stimulating and bactericidal and may be summarized as follows: "Its prime action in the treatment of alopecia rests in its power to produce a vasomotor dilatation, causing a physiological hyperæmia lasting for several hours. This hyperæmia is mainly caused by the action of the actinic rays upon the vaso-motor nerves. (These rays have been extensively and very successfully used in the form of the Finsen light in the treatment of alopecia areata.) Their action is materially enhanced by the severe electrical bombardment and also by the heat effects.

" During the period of hyperæmia, which lasts from six to twelve hours, the hair follicles receive an increased blood supply, and increased resistance to germ invasion is established. The fact that this hyperæmia ceases after a few hours is very important, as when a hyperæmia lasts for several days or weeks it becomes a chronic congestion, causing a hypertrophy of the connective tissue cells, produces a soil of low vitality, and liable to produce very untoward results. The bactericidal properties of the spark are both powerful and penetrating. This effect is produced by the actinic rays, by the heat effects, and also by the production of large quantities of ozone. This ozone is practically produced upon the scalp and undoubtedly penetrates to some extent, for its odor can be detected some hours after a treatment."

Several very instructive cases are reported of which we quote one in full as follows: "M. F., female, twenty-five years of age, poor general health and of a neurotic temperament. Two years previous to her first consultation she had an attack of alopecia, which was diagnosticated of nervous origin, and successfully treated by the use of a mixture composed of resorcin, capsicum, cantharides, castor oil, and alcohol. She first came under observation December 6, 1905, presenting a scalp apparently free of disease, but with the hair falling out at an alarming rate since the previous August. The hair was very thin on the top of the head, and on the right side of the median line the scalp was almost denuded. Persistent treatment had failed to relieve this alopecia, which was undoubtedly caused by overwork and worry. Sparkings were commenced immediately and the patient advised to have three treatments weekly. No internal medicine or local chemical applications were prescribed. On December 26, the hair had entirely ceased to fall out. On February 1, 1906, a heavy growth of down was in evidence. On March 1, the case was progressing so favorably that the sparkings were discontinued and a mild stimulating hair tonic prescribed. Throughout the treatment this patient was very irregular in attendance, had extensive business transactions, accompanied with considerable worry, and suffered from several heavy colds. At the present writing the new growth of hair appears perfectly healthy."

High Frequency Currents in the Treatment of Cryesthesia Due to Arterial Hypertension. (*Dr. Legendre, Annales d' Electrobiologie, May*, 1906.) Report of a case successfully treated by six applications of high frequency. Though symptomatic medications are almost always fraught with danger, says the writer, we have here a case in which the electrical treatment proved useful at the same time both against the symptom and against the disease itself.

F. E. G.

Thirty Cases of Hemorrhoids Cured by High Frequency. (*L. Stembo, Annales d' Electrobiologie, May*, 1906.) One pole of the secondary spiral of the transformer is connected with the earth and the other with a slightly conical electrode wrapped in tissue paper; the point of the latter is lubricated with vaseline and introduced into the anus, the patient lying in the recumbent position or standing up with legs apart. Current is allowed to pass during three minutes. After this, effluvation is given during three minutes. Recovery is quick in acute, slower in chronic cases. Treatments should be given every other day.

F. E. G.

Treatment of Gonorrhea and its Complications by High Frequency Currents. (*Dr. Sudnik, Journal de Physiotherapie, July* 15, 1906.) All inflammatory phenomena of gonorrhea disappear after three or four applications when the disease is treated early. Early cases of orchitis are stopped after three or four applications; 8-15 treatments are necessary for a perfect cure. Buboes and abscesses are curtailed in the same way when treated before the suppurative period. Direct applications are best for chronic cases while effluvation is the method of election for acute cases. The writer uses electrical irrigations.

For the discharge itself the tube of the irrigator ends in a small ebonite container to which is adapted either an ebonite Janet canula or a Nelaton catheter. The liquid of the container is in contact with a current connexion attached also to one of the extremities of a small solenoid. The current must pass during 10-20 minutes; the nature and the quantity of the irrigating fluid are rather indifferent. Eight to fifteen treatments are sufficient in favorable cases; not unfrequently after the first applications a temporary aggravation takes place. Circular electrolysis of existing strictures may be added with great advantage.

Diuresis Resulting from High Frequency Treatment in the Autoconduction Cage. (*Delherm and Laquerriere, Bulletin Officiel de la Societe Francaise d' Electrotherapie, August and September*, 1906.) They sometimes noted an increase in the amount of urine, especially in the following four cases: 1, Arterial hypertension, increase in daily excretion, 500 cc; 2, Arterial hypertension, increase 400 cc; 3, Migraine without hypertension, increase 300 cc., cure of migraine; 4, Chronic rheumatism, increase 600 grammes, astonishing relief of pathiological phenomena. *S. T.*

Effect of General Application of High Frequency Currents upon Capillary Circulation. (*Drs. Laquerriere and Delherm, Bulletin Officiel de la Societe Francaise d'Electrotherapie, August, September*, 1906.) In 36 out of 57 examinations made on 28 patients there was distinct increase in amplitude of capillary pulse. The other examinations showed little or no change. They failed to observe any effect upon arterial tension such as described by Moutier. *S. T.*

High Frequency Currents and Blood Pressure. (*Dr. Chanoz, Annales d' Electrobiologie et de Radiologie, June*, 1906.) Difference in results reported by Moutier and by Bœdeker, both experimentally and therapeutically are attributed to difference in apparatus. The French apparatus almost always has the spark gap between the inner armatures of the Leyden jars; consequently the secondary of the induction coil is short-circuited there and its capacity and resistance do not enter into the calculation of the oscillations in the high frequency apparatus and the patient. The contrary is the case with the German apparatus in which the spark gap is between the two outer armatures. The physical effects are demonstrably different and different physiological effects are accounted for. *S. T.*

High Frequency Currents and Arterial Tension. *Prof. Doumer, Archives d'Electricite Medicale, July* 15, 1906.) This paper emphasizes the discordances in results, due to the fact that the only common feature of what is known as a whole under the name of high frequency is the extreme frequency of the oscillations, while the means of producing such a frequency differ widely from one another. The body of the article is also devoted to

Moutier's work in that line. Doumer's experience is confirmative of Moutier's. "Tension" currents increase arterial pressure; "quantity" currents lower hypertension.

F. E. G.

High Frequency Currents, Their Action on Blood Pressure; Application to the Treatment of Arterial Hypertension and Accessorily to the Treatment of Diabetes. (*Dr .M. Chanoz, Archives d'Electricite Medicale, July* 15, 1906.) The first part of the paper is devoted to purely theoretical and mathematical considerations. One thing must be remembered, high frequency currents are characterized by the rapidity of the electrical vibrations; but the modalities are quite different according to the device used and that explains the differences in the physiological action noted by several experimentators. Thus there are flat contradictions between d'Arsonval and Boedeker on the question of the influence of these currents on blood pressure. Moutier seems to be the only one to obtain constant results; this is probably because he is the only one to always use the same technic. Local applications along the spine cause a rise in blood pressure; autoconduction lowers hypertension. The German authors have contradictory results. The writer studies then Moutier's technic and results, which have already been abstracted in this periodical; and incidentally treats the question of autoconduction in diabetes. The general condition of patients is always improved, but the action on glycosuria varies according to cases. Sometimes the sugar disappears entirely, sometimes only partially. It will be necessary henceforth to compare results only when obtained with modalities that can be compared between themselves.

F. E. G.

High Frequency Currents and Arterial Tension. (*Dr. Doumer, Annales d'Electrobiologie et de Radiologie, June,* 1906.) The author calls attention to the fact noted by d'Arsonval and Moutier that high tension effluvation, especially of the spine, causes elevation of arterial tension, while autoconduction and a bipolar application from the d'Arsonval small solenoid, connecting the patient with two electrodes, lower arterial tension. Effluvation gives excellent results in the hypertension of neurasthenia, but is contraindicated in every case in which the arterial tension is over 160 mm. of mercury.

In his own treatment of hypertension he has tried to use a field exactly 156,000 Gauss, the source of current being a Rochefort induction coil of 50 cm. spark-length and charging flat condensers immersed in petroleum. The intensity of the field in the autoconduction cage was indicated at all times by the following method:

Doumer's Gauss-meter consists of a single loop of wire connected at each end with the terminals of an ampere meter. The surface measurement of the wire loop expressed in square centimeters being made equal to the resistance of the ampere-meter in ohms, the number of amperes indicates the number of megagausses. One megagauss equals one million Gauss. The seances lasted ten minutes. The different cases (4) had arterial tensions of 270, 260, 300 and 260 mm. which were reduced in one or two weeks to 160, 155, 190 and 155 mm. respectively. *S. T.*

High Frequency Oscillating and High Periodicity Pulsating Currents in Medicine. (*Robert Wilson*, *New York Medical Journal*, *July* 21, 1906.) In an interesting article on high frequency currents, etc., in which he explains the rationale of their generation and the physical conditions under which they may be produced the author has this much to say concerning their physiological action :

" We are all aware how fallacious experiments on the lower organisms are when one would make deductions applicable to the larger and more complex human being. Witness the experiments, classic in their completeness, recorded by Freund, on the influence of high potential undirectional currents and high potential oscillating currents of high frequency on bacterial growth and on epilation, with the known results of these currents on the human body. Much more satisfactory are the records of experiments on the human subject of these oscillating high frequency currents with reference to its metabolism, although even here details are lacking to show whether the currents used were really oscillating or pulsating currents, especially in the autoconduction cage, with its large self induction factor. For instance, in a cage 12 inches in diameter and having 60 helices three-eighths of an inch apart, with a total length of 188½ feet and one-tenth of an inch thick, the inductance is 0.001,661 henrys, and the frequency drops from 10,000,000 per second (with eight loops) to 138,000 per second. With a cage of three feet in diameter, with 30 loops, and a length of 565½ feet, the inductance is 0.000,0762 henrys and the frequency a little over 180,000 per second—dangerously close to the complete damping out of any oscillation. With the autocondensation couch the results are much more reliable as to the true oscillatory character of the current.

" Here without doubt great benefit has been obtained in diseases due to malnutrition or defective metabolism. As to the primal causes of these physiological effects, I am not prepared to agree with Freund when he says they are all attributable to the derivative or irritative action of a current of high potential alone, and to classify the physiological effects as on a par with faradic, galvanic, and high potential unidirectional currents of a Ruhmkorf coil. Much more acceptable and more in line with logical sequence is Tesla's explanation of a molecular massage effect. The reports of Klemm, Pfeffer, Roux, Hodge and especially Valenza (quoted by Freund), on the effect of the current on the cell substance and in the latter's case on the torpedo fish, where the high potential and high frequency currents produced important retrogressive changes in the nerve cells, especially in the nuclei as a chromatolysis caryorixe and hyper-chromatosis, the cells adjacent to the electrode contracting with irregular outlines and hyper-chromatosis of its contents, the nucleoli becoming absent, parts remote showing an increase in the volume of the nucleus hyperchromatosis of nuclear wall alone, while the nucleus still remaining in evidence (Valenza, quoted by Freund). This, I think, would tend to disprove those who believe that the high frequency current resides chiefly on the surface of the body and penetrates but little. We lack here a series of experiments on large animals (say, dogs) with properly guarded electrodes to penetrate the body, and so determine whether the current density varies much within and on the surface. Nor must we, in considering the physiological effects of these currents, forget the possibility of a synchronous vibratory effect or the possible effect of these almost inconceivable high frequency alternations on the natural contractility of protoplasm."

A New Medical Rheostat. (*Dr. Allaire, Bulletin Officiel de la Societe Francaise d' Electrotherapie, August-September*, 1906.) Positive electrode a carbon rod, negative electrode a sheet of aluminum rolled into a cylinder somewhat larger than and surrounding the carbon. Both fixed in position and completely covered by distilled water and the liquid path between them is regulated by three glass cylinders. One is fixed in an insulating material at the bottom of the jar and extends up around the carbon rod. Its height is three or four centimeters and it is large enough to allow another glass cylinder to pass down between it and the carbon. The other two cylinders, one inside the other and separated by an air space, are sealed together above and when they are lowered over the lower tube, one inside and the other out, they completely cut off liquid communication and hence conduction between the carbon and the aluminum. The top of the inner cylinder is beveled so as to make the charge from the full current to practically complete absence of current gradually. The current can be regulated down to three or four tenths of a milliampere even with the 220-volt direct current. The minimum resistance is 10 ohms.

S. T.

Experimental Researches on Liquid Contacts. (*M. Chanoz, Annales d' Electrobiologie, May*, 1906.) Devoted to the subject of electromotive force developed at the point of contact between different liquids or liquids of different degrees of concentration. A valuable study.

F. E. G.

RADIODIAGNOSIS

The X-ray in the Diagnosis of Urinary Calculus. (*James R. Riddel, Annales d' Electrobiologie et de Radiologie, June*, 1906.) Stomach and intestines being empty, patient lies face down on a canvas litter with an air bag (bladder or a foot ball) under the abdomen producing compression and overcoming the normal posterior concavity of the lumbar spine. Tube underneath. First determine presence and position of calculus by fluoroscopic examination also best position for tube and plate. Then place plate on patient's back and make the radiograph. Technique either (1) 15 cm. coil Wehnelt interrupter, 100 volts 15 to 18 amperes, 5 to 20 seconds; (2) 12 1-2 cm. spark coil mercury jet interrupter 110 volts 4 amperes, two or three minutes; (3) coil 15 cm. McKenzie Davidson interrupter, 50 volts, 8 or 12 amperes, time up to two or three minutes. Distance from anticathode to plate seventeen inches. Resistance of tube (Muller heavy anticathode) 37 to 65 millimeters. He sometimes fastens a cross or wire upon the skin of the lumbar region during exposure, marking its position later with India ink. This serves as a landmark, the wire being pictured on the plate. Compression diaphragm gives clearer definition if you know just where the stone is. The fluoroscope shows less respiratory movement in calculus than in intestinal masses. *S. T.*

Dangers of Local Radiography (Compression Diaphragm) in the Detection of Calculi of the Urinary Tract. (*G. Contremoulins, Annales d'Electrobiologie, May*, 1906.) Since 1898 Contremoulins has always defended the cause of total radiographic explorations of the urinary tract in cases of stones. The use of localizers has untoward consequences both for the physician and the patient. Dermatitis is frequent owing to the short distance between the tube and the skin; on the other hand, as four very demonstrative examples reported here show conclusively, those narrow-field radiographs do not answer their purpose.

No attention whatever must be paid to clinical symptoms. A radiographic examination is essentially a method of information and control absolutely independent of any personal observation; therefore it must not be resorted to in order to confirm or to disprove a diagnosis or a prognosis, but simply to give, by an impersonal analysis, an answer to the two following questions: Presence or absence of calculi; nature, shape and location of same. Albers-Schonberg's compressor exposes to radiodermitis, not on account of a frequently incriminated idiosyncrasy, but simply because the X-ray source is much too near the skin. Contremoulins says that if a tube is placed at a distance varying from 20 inches with French models to 24-28 inches with German models, there is not the slightest fear of accidents and he bases his contention on more than 19,500 cases. He has performed 1152 examinations of the urinary tract for calculi.

His technic is as follows: The patient, with stomach and bowels empty, lies in the recumbent position, thighs slightly flexed so as to have the renal region flat on the radiographic frame. If the patient is fat, a general abdominal compression is necessary and very easily obtained with a wooden plank; the plate must measure 16 by 20 inches and is contained in a frame impervious to actinic rays and transparent to X-rays. It is very important that the frame be nonconductor of heat and impervious to moisture. Two opaque screens are applied, one on each side of the patient and maintained tightly against him in order to avoid halos. The anticathode is at 30 inches from the skin and the normal incident ray passes through the navel.

Several examinations, at a few days' interval, are necessary. Errors may be due to three different causes: irregularities of the plate; incompletely empty bowels; mobility of the calculi. The operator must read his radiographs himself and send to the surgeon diagrams showing the important points of each one of them.

F. E. G.

The Berlemont Automatic Regulating Crookes Tube. (*Journal de Physiotherapie, July* 15, 1906.) When the tube is too hard, the operator has just to open a stopper, thus establishing a communication between the tube itself and an annexed auxiliary tube containing moistened cotton wool. Moist air passes through the tube and as at the same time the anode is heated red by the current, the water is dissociated and hydrogen is liberated and regenerates the tube in a few minutes.

F. E. G.

RADIOTHERAPY

Roentgen Rays and Affections of Hematopoietic Organs (Leukaemias and Pseudo-Leukaemias). (*J. Belot, Archives d'Electricite Medicale, July* 10, 1906.) This paper is much in the same style as that of Dr. Barjon abstracted in the preceding number. Both will be discussed at the same scientific Congress. Three years only have elapsed since Senn of Chicago published his first cases but there are already 200 cases on record and considerable experimental work by Heineke, Aubertin and Beaujard has thrown much light upon the question. Of all diseases of the hematopoietic organs, the most favorably influenced are chronic leukæmias. The decrease in the number of the white corpuscles is not obtained at once. There is a temporary increase at first after each irradiation, but this temporary increase is always followed by a permanent decrease. Some drugs, such as arsenic, decrease sometimes the number of white corpuscles, but they do not modify the percentage of the different kinds of white corpuscles abnormally found in the blood of leukæmic patients, while X-rays seem to have a qualitative as well as a quantitative action; under their influence myelocytes decrease from 50 per cent to 30 per cent in a few weeks and to one per cent or even none in a few months. In lymphoid leukæmia, that qualitative improvement does not come as quickly as in myelogenic cases and it seems even to happen only after leucopenia has been attained. In myelogenic leukæmia, the most powerful effect is on myelocytes; in lymphoid leukæmia, it is on lymphocytes. While the white corpuscles decrease in number, red corpuscles increase, sometimes surprisingly, both in number and in a hæmoglobin value. The spleen shrinks progressively. Same with lymphatic glands and there is a parallel improvement of the general condition. The improvement is more constant in cases of myeloid than in cases of lymphoid leukæmia. Failures are almost regular in acute or subacute leukæmia.

In aleukæmic splenomegalia, the results are uncertain; this is probably due to the diversity of anatomical conditions underlying the splenic hypertrophy. In Hodgkins's disease, radiotherapy yields generally good results but some cases remain uninfluenced. X-rays do not seem to determine a permanent cure of leukæmia, which is not surprising considering the extension of the lesions. Accidents are few. Dr. Belot concludes by saying that the physician who does not give X-rays to a leukæmic patient is as culpable as he who does not give mercury in a case of syphilis.

F. E. G.

Action of Roentgen Rays upon the Central Nervous System. (*Dr. Colombo, Annales d'Electrobiologie et de Radiologie, June,* 1906). Case of chronic varicose ulcer of leg in a hysterical woman. Two H. (six Benoist) applied every three days to an area 21 x 36 mm., rest of patient shielded. After 14 H. applied in 28 days very severe nervous and hysterical convulsions which were repeated when the X-ray was again applied and followed, after a period of rest from treatment for a week, by the appearance of very severe pain in the ulcer from the thirty-fifth day on. But in spite of this, treatment was recommended and continued up to the fifty-eighth day, making a total of 40 H. applied in fractional doses. The ulcer looked well but was extremely painful and the pain extending to every part of the body treatment was stopped. The subsequent course of the case is not known. From the small size of the surface irradiated and the absence of fever the author does not think the symptoms due to septic absorption. He considers it a case of reflex irritation of the central nervous system from the local application of the X-ray in a weak and hysterical person. The doses, he says, are moderate though they seem large (40 H. in 58 days) to us who have been accustomed to 7 H. in 21 days which would be 40 H. in 120 days.

The Varieties of Ringworm and Their Treatment. (*James H. Sequeira, The British Medical Journal, July* 28, 1906.) The various parasites that are involved in the causation of this disease are discussed at some length, and the statement is made that the treatment of ringworm of the non-hairy parts is rarely a matter of great difficulty, parasiticide remedies thoroughly applied being always efficacious. The greatest difficulty has been found in treating ringworm of the scalp and beard, the difficulty being to secure thorough removal of the infected hairs and prevention of the spread of the fungus to healthy follicles. The older methods have been inefficient, but the X-rays have proven entirely satisfactory when applied according to improved methods as regards dosage.

Sequeira speaks highly of the Sabouraud-Noire pastille, preferring single large doses to the fractional doses. Epilation takes place within three weeks and the hair begins to grow again in from two to four months. When compared with the older methods, which require a year sometimes, the enormous advantage involved in the use of roentgenization becomes at once apparent. "Epilation occurs more easily in children with thin fair hair than in children with tough dark hair," and he modifies the dose accordingly. The beard reacts more easily than the hair of the scalp. The X-rays have no lethal effect upon the parasite, their sole function being to bring out the hairs with the fungus. It is essential, therefore, that the rest of the scalp be protected from the falling hairs.

Sequeira prefers a tube giving rays Nos. 6 or 7 of the Benoist scale, a spark-gap of 12 to 15 cm., and about 0.7 ma., in the primary circuit. He does not think that the softer tubes are as efficient. His general technique is as follows:

"The hair is cut short, and the infected area is exposed for a definite time to the rays at a distance of 15 cm. from the anode of the tube. With the interrupter making 500 interruptions a minute, and the conditions as above described, sixteen minutes is sufficient to cause complete epilation of the area exposed. The exposure is controlled by the Sabouraud pastille. This little disc coated with platino-cyanide of barium is placed midway between the anode of the tube and the area under treatment. When a sufficient dose of X-rays has been given to produce epilation, the pastille changes from a yellowish-green tint to an orange. It is a useful adjunct to our means of estimating the dose of X-rays, and though there is some variation in the pastilles I find them of great value in checking the dosage. It is essential that the pastille be placed exactly midway between the anode and the area treated, and that it be not exposed to light, for the orange tint vanishes on exposure to strong light. At the end of the sitting the area which has been treated is covered with collodion and the patient goes home. The collodion is painted on to prevent the rest of the scalp from becoming infected. At the end of a fortnight the hair begins to fall out, and at the end of three weeks it is completely shed. Once more it is important to insist that the X-rays do not kill the fungus, and therefore it is a wise precaution to apply a mild anti-parasitic remedy to the rest of the scalp.

"In extensive cases it may be necessary to expose the whole scalp. This requires great care to prevent overlapping, for if any area gets a double dose of X-rays a troublesome erythema, and possible vesication and ulceration with risk of permanent alopecia, may result. The area treated is marked out with iodine, and it is advisable to expose as small an area as possible each time. For if a large area be exposed the parts in the center get a larger does of X-rays than the margin. This is particularly the case when curved parts of the skull are treated.

"In treating an area 10 cm. in diameter, the center of the patch may get a dose thirty per cent larger than that received by the periphery. I think that this difficulty may be obviated, and am at present directing my attention to overcoming it. It will be seen that to get a complete epilation of the scalp it is necessary to make several exposures. To do this carefully requires two to three hours, but when we remember that the hair falls three weeks after the treatment, and that as soon as the hair has fallen the patient is free from infection, the time saved is enormous. I have already indicated that great care is required, for it is easy to give an overdose and it is easy to give an insufficient dose.

"The ringworms of the beard are treated in an exactly similar manner. The pustular varieties are at first aggravated by the application of the rays, and the increased inflammation requires fomentations of boracic acid.

"Kerion of the scalp does not, in my experience, require X-ray treatment. The inflammatory process itself loosens the hairs and causes them to fall. I find that fomentations of boracic acid constantly applied are sufficient to bring about a cure.

"Favus is treated exactly as the ringworms of the scalp. I have now applied the X-Rays in about 150 cases of ringworm and favus, and in 115 in my hospital and private practice, epilation by the Sabouraud method at one sitting has been performed. The following particulars may prove of interest:

"The 115 cases included 107 of tinea tonsurans (the microsporon found in every instance), and eight cases of favus.

"The 115 cases required 455 exposures to the rays; many of the cases being complete epilations, and others requiring treatment of several spots.

"In two cases only epilation was incomplete.

"In two cases there was slight overlapping. In one an erythema resulted, and in the other vesication. In no other case was there any inflammatory reaction which called for treatment.

"In 15 cases the hair was found to be growing again at the end of one month.

"In 46 cases the hair began to grow again at the end of two months.

"In 23 cases the hair did not start growing until after three months.

"In two cases the hair did not appear until after the lapse of four months.

"In 21 cases the patients failed to come up to the hospital until three months had elapsed, and then only when they were written for. It must be understood that many of the patients at the London Hospital are children of foreigners and it is difficult to keep in touch with them.

"Twenty-five cases of sycosis and tinea barbæ have also been treated by the rapid method. Epilation has been satisfactorily produced in all."

Radiotherapy in Cutaneous Epithelioma. (*E. Chuiton, Archives d' Electricite Medicale, July* 10, 1906.) Chemical cauterization has outlived its period of usefulness now and all caustics must join the already long list of abandoned drugs of oldtime pharmacopœias. The knife is indicated when a total and clean extirpation of the whole mass can be followed by immediate suture. In extensive cases, a good scraping will make the task of the X-rays easier. After a cure has been obtained, surgery may still claim its due when an autoplasty is needed. The cases of epithelioma of the lower lip will be left to surgery alone. Radiotherapy is now, without any possible contest, the method of election for all cases of cutaneous cancer when the glands are not yet involved. When the latter are invaded, it may still be useful as a prophylactic measure after a surgical excision.

F. E. G.

Presentation of Several Patients Treated by Radiotherapy. (*Dr. Belot, Journal de Physiotherapie, July* 15, 1906.) 1. A case of limited neurodermitis cured by two applications (3x2 H) confirmative of several cases already reported by the writer. The technic is simple: a piece of opaque paper is cut so as to let only the diseased part and half an inch around it exposed. Slightly penetrating rays (5-6 B.) total dose not more than four or five H, three or four are generally enough and even two or three H. where the skin is thin and tender.

2. Tuberculous gumma of the cheek in a girl eight and one-half years old. Three and one-half H. rays 7-8. Cured by six applications, two mild complementary applications to prevent recurrence.

3. Persistent keloidian acne of the nape of the neck. Dating back six years, three applications bring an almost perfect cure and then treatment is interrupted on account of a compulsory period of military instruction. Upon resumption of treatment, a permanent and definite cure will most certainly be obtained in this case which has resisted all possible medications. In that affection, do not give more than three to three and one-half H. and carefully avoid all reaction.

4. A case of *epithelioma cured by radiotherapy;* the interesting feature of the case is an attempt at a sensibilization by the use of fluorine, which proved unsuccessful.

F. E. G.

Kienbock's Quantimeter. (*Dr. Belot, Bulletin Officiel de la Societe Francaise d'Electrotherapie, August, September,* 1906.) This consists of slips of bromide photographic paper enclosed in black envelopes, to be laid upon the surface of the skin and exposed to the X-ray during its therapeutic application. After the estimated length of time the current is turned on, the sensitive paper is developed according to explicit directions in a little developing cabinet furnished with it, and compared with the different colors of a standard scale. The graduation is such that 2x=1H. Kienbock's units (x) are twice as small as Holzknecht's and the scale is graduated in 1-4 units from 0 to 20. *S. T.*

Protection of the Eye during X-ray Treatments. (*Dr. Bettremieux, Archives d'Electricite Medicale, July* 10, 1906.) The writer has had metallic (German silver) eye protectors made by Luer and has tried them comparatively with similar appliances in lead glass. He has found the former easier to place and to remove on account of a short handle inserted in their center (which does not at all prevent X-rays from reaching the part under treatment) and much more impervious to X-rays. *F. E. G.*

Radium Employed in the Cavity of the Uterus. (*Dr. Oudin, Bulletin Officiel de la Societe Francaise d' Electrotherapie, August, September,* 1906. Glass tube in a hollow aluminum stem 75 per cent. pure radium bromide, *i. e.*, 150,000 radioactivity 25 milligrammes, tube 25 mm. long, 2 mm. thick. Left in uterus 10 or 15 minutes. Two cases of uterine fibromyoma with hemorrhage treated. Three or four applications at intervals of six to ten days. Hemorrhage stopped in three days, size of tumor markedly reduced and uterus rendered mobile. Same technique for one case of severe uterine gonorrhœa. Two treatments and complete cure in 20 days. Six cases of urethral gonorrhœa, one cured, others benefited, discharge reduced and gonococci very greatly lessened. *S. T.*

Suitable Diet during Second Year. (*Margaret P. Brewster, M.D., Grantwood, N. J., Journal of the Medical Society of New Jersey, August,* 1906.) Many babies do not gain weight and strength properly after three or four months. Among high-strung women of the better class the milk fails both in quantity and quality at the sixth or seventh month. In a large portion of cases accessory feeding is advisable at this time. Cereals may be given with properly modified milk, and at eight or nine months vegetables and fruit.

By the tenth month breast feeding may be stopped altogether, and the following diet may be given:

First meal, breakfast, 7 a.m., oatmeal jelly, rice, wheat, barley jelly, arrow root, with butter and without sugar, or with milk. Milk to drink after the meal.

Second meal, 10 to 11 o'clock, potatoes, boiled with the skins on and mashed with butter or milk, spinach, young carrots, peas, stringed beans, all mashed fine with very little salt, baked apple, apple sauce and prunes. With this meal no milk. Water is given after the meal is finished.

Third meal, 3 o'clock, bread and milk, oatmeal and milk, or bread and butter and milk. Egg is given with this meal once, and later twice, a week.

Fourth meal, 6 to 7 o'clock, cereal and milk and vegetables.

At about the twelfth month raw milk is given. Meat, cane sugar and meat soup are prohibited, and only a little salt is allowed. To this diet are gradually added raw apples, peaches, pears and grapes, and eggs more frequently, so that by the end of the second year one egg daily is given. Raw fruit is given one hour afterward, and not with the meal. By this time the child has three instead of four meals daily.

Children fed on this mixed diet seldom suffer from serious digestive troubles, and they are never constipated. Exclusively milk-fed babies, especially if given from a bottle, do not like to eat solid food. Those who have had sweetened or malted milk do not like vegetables. Those who have had meat soups and meat juice will not at first take either cereals or vegetables. The use of a bottle, night feeding, feeding between meals, or the use of cathartics should be forbidden.

Any child one year old, not acutely ill, can take properly cooked spinach, carrots, or French peas in small quantities.

If constipation is a prominent symptom, clean out the lower bowels thoroughly with a warm enema, given with a long rectal tube. Give orange juice night and morning at least one hour before or after meals, and olive oil on food if the child will take it; if not give it in teaspoonful doses after meals once or twice daily. Order gentle massage of the abdomen, followed by a small cold enema, to be given at a regular hour daily. When the stools become normal in consistency, omit the enema for one, and later for two days at a time.

Later in the second year the following diet list may be followed:

Breakfast: Hominy, cream of wheat or strained oatmeal, with cream or milk, but no sugar, bread and butter, baked potato, mashed with salt and butter. Milk to drink after eating.

Dinner: Every day an egg. Rice,

hominy, baked potato, spaghetti. With every dinner have cereal as vegetable.

Supper: Corn meal, rice, hominy cream of wheat or strained oatmeal, baked potato, bread and milk or milk and butter. Milk after eating. As dessert, fresh raw fruit.

G. E.

MISCELLANEOUS

A Case of Exophthalmic Goiter Treated by Electricity and Serum Therapy. (*Dr. Raoul Marque, Bulletin Officiel de la Societe Francaise d'Electrotherapie et de Radiologie, May,* 1906.) In the case reported by the writer, the patient was old (64 years), the lesion was ancient and the symptoms very marked; nevertheless, a most remarkable improvement, almost equivalent to a cure, was obtained in a surprisingly short time on the use of the following treatment: teaspoonful of "hemato-ethyroidine Carrion" three times a day, at meal-time (the latter substance being a glycerin extract of the blood of sheep which have been surgically deprived of their thyroid bodies; (2) galvanization, positive electrode, 15x12 cm. on the nape of the neck, negative 10x8 cm. on the goiter, 50 ma. during a quarter of an hour. The resistance of the skin being considerably diminished, as is always the case in Grave's disease, the above mentioned intensity, which causes pain to ordinary patients, is very easily tolerated and the vaso-dilatation extends far outside the electrode, on an area at least three times larger than the latter; (3) faradization during 10 minutes over the precordial region, medium wire coil, same electrodes, tolerable intensity. Five minutes of faradization of the sympathetic nerve on each side. Treatments given every other day.

Five such electrical treatments gave such an improvement that the patient, considering himself cured, discontinued the treatments. What part in the cure must be ascribed to electricity and what part to serumtherapy? As electricity has more influence on the goiter, the tremor, the sensation of warmth and the perspiration, and, on the other hand, serumtherapy especially affects cardiac erethism and frequency of the pulse, it seems that both treatments are very nicely complementary to each other.

The Treatment of Neurasthenia. (*Guthrie Rankin, British Medical Journal, March* 3, 1906.) The author considers that: "The first and obvious indication for treatment is rest, which must be both mental and physical. Now, rest is one of those therapeutic agencies which is capable of much harm as well as of great good. In every case of neurasthenia the influence and associations of the home surroundings are so inimical to the patient's recovery that the rest which his tissues demand can be accomplished only by separating him temporarily from his relatives and from his usual pursuits. This does not necessarily imply imprisonment in a nursing home, with recourse to all the restrictions and privations which belong to the Weir Mitchell system. In suitable cases, this well-known system is excellent and can be depended upon to give better results than any other, but it is habitual with some practitioners to regard every neurasthenic patient as a fit and proper person for whom to prescribe this rigorous method of treatment. Such rule-of-thumb practice is unfortunate and is frequently attended with disappointing results.

"The class of patient to whom it is pre-eminently applicable is the person whose symptoms are bordering on hysteria and who has become much emaciated, but the cases most frequently met with are not of this type. Surely for a disease so protean as neurasthenia there can be no one plan of cure universally and unalterably applicable! Though rest is essential for all, the form in which it may be best administered must be determined by the individuality of the sick man, his personal tastes, and the limits of his business obligations and financial resources. Restoration to health will only be accomplished by careful correction of existing physical disturbances; by a re-education of the various organs to a normal performance of their functions, together with the moral influence of a hopeful and cheery optimism; and by provision for the future conduct of life with a due regard to regularity of habits and adaptation of bodily demand to vital supply. Frequently relaxation from the duties of an overstrenuous life and an ocean voyage or other agreeable form of easy travel with a congenial companion is all that is required to banish the symptoms, but in cases that are more advanced, as most are that seek medical advice, such a programme is of greatest benefit when undertaken after the bodily functions have been regulated and re-established on something like a normal basis. This can be best provided by what may be described as a modified rest-cure. For the successful carrying out of such a plan, the patient should be established in comfortable rooms or in a nursing home, under the constant care of a judicious nurse; all intercourse with his relatives and all participation in the business or professional concerns of his life must be temporarily abandoned; the food must be regulated according to the circumstances of the digestive capacity, but as soon as possible the diet should be generous and into it milk and fats ought to enter abundantly; and a discipline of regularity in regard to meals, hours of resting, time for turning in for the night, etc., should be established.

"For the first week or ten days absolute rest in bed is a necessity, but thereafter a daily drive, soon to be replaced by walking exercise during the afternoon, is desirable. After the first week the patient may have one welcome visitor, other than a near relative, at a suitable time each day. He should be encouraged to read newspapers, magazines and light literature; to occupy a part of his time in the pursuit of an artistic hobby or in playful pastime, but without incurring the risk of over-weariedness by too long attention to any one occupation; he will thus keep his mind so pleasantly and diversely engaged that he will have but little opportunity for introspective reflections.

"For the improvement of his muscular system he must be massaged night and morning, and the application of a faradic current adds to the value of the rubbing, and is also effective as a suggestive remedy. Above all, the patient should be made to feel that he is being subjected to a well-planned and energetic method of management to which he is called upon to lend a willing obedience and whole-hearted co-operation.

"Not the least important item in the daily routine is the doctor's visit. It is looked forward to for confirmation of the patient's hope that he is responding satisfactorily to the means that are being adopted for his cure; it is the event upon which he unconsciously depends for reassurance, and from which he derives gradually, and day by day, courage and confidence."

Digestive troubles are usually inseparable from the neurasthenic condition and, of course, should be corrected. Sleeplessness also frequently requires attention, and change of air and surroundings is always desirable for a few weeks, either at the seaside or in the country, before a return to the ordinary duties of life is sanctioned.

BOOK REVIEWS

The World's Anatomists, by G. W. H. Kemper, M.D., Professor of the History of Medicine in the Medical College of Indiana, Indianapolis, Indiana. With 11 illustrations, nine of which are portraits. P. Blakiston's Son and Company, Philadelphia, 1905.

This little volume of 79 pages comprises biographical notes relating to those students and teachers of anatomy whose names are more or less familiar to the student of today, because they have been associated with some anatomical structure. Some, like Friedrich Goll, a Swiss anatomist, for whom the tract of Goll in the spinal column is named, are briefly treated in three lines, while others, like Marcello Malpighii, whose name lives on in the rete Malpighii, occupy 26 lines, or like Claude Bernard, whose name has been attached to a supplementary duct of the pancreas, also called santorinis canal, are given 24 lines. Charles McBurney, of "McBurney's point" fame, is mentioned in ten lines, and Professor Burt G. Wilder, of Cornell University, in seven lines.

Naturally most physicians of the present day would turn quickly to read about the beloved and immortal Gray. Sad to relate the reader of this little volume will find only:—"Gray, Henry. English. Born in 1825; died 1861" in "A partial list of prominent authors, who have contributed works on Human Anatomy," a list which includes Harrison Allen, Luther Holden, Joseph Leidy, and a dozen others.

It is to be devoutly hoped that the present edition will be quickly exhausted, so that the author in a second edition, may tell us more about the anatomists in whom the average man feels a deeper interest than in Bekhtereff or Ehrenritter, Mauchart or Riolan.

As it is, the little volume is one which should be in the hand of every first-year medical student, so that he may have the opportunity of learning that many curious proper names, which he finds associated with various anatomical structures, really once did have some association with a living being.

G. E.

Traitement de la Tuberculose par les Courants de Haute Frequence et

de Haute Tension, Base sur Letude du Chimisme Respiratoire, by Dr. H. Thielle. Megard at Cie, L. Megard Successeur, Rouen, 1905.

Thielle has made a study of the abnormalities in function as found by the microscope and by chemical analysis in cases of tuberculosis and also of the effect of high frequency effluvation upon these functions. An excellent table of the chemistry of respiration gives the average figures in health and in men and women with chronic phthisis. The items which are tabulated are: pulse, respiration, total respiratory capacity, respiratory capacity per centimeter of height, carbonic acid produced per 100 parts of air expired, oxygen consumed per 100 parts of air expired, ventilation per minute, carbonic acid produced per minute, oxygen consumed per minute, oxygen absorbed by the tissues per minute, ventilation per minute per kilogramme of bodily weight, the same as regards carbonic acid, oxygen consumed and oxygen absorbed by the tissues, total exchanges, respiratory quotient, coefficient of oxidation, coefficient of absorption.

The history of each case contains a table of these items before, during and at various periods after the course of treatment. Also a similar table of the blood and urinary examinations.

In chronic phthisis the respiratory capacity is perhaps only about half the normal while the rate of pulse and respiration are perhaps 50 percent greater than normal and all the exchanges are greatly augmented. Thielle's gives the increase in oxygen absorbed by the tissues per kilogramme-minute as 162 per cent in consumptive women and 95 per cent in consumptive men. The amount of carbonic acid exhaled per kilogramme-minute is increased 86 per cent in women and 64 per cent in men patients.

He believes that consumptives often have an arthritic diathesis and that this has a great effect in lowering the resistivity of the blood cells and fixed tissue cells to bacillary infection.

For the estimation of this condition and as a further test of oxidation and other respiratory effects the urine is most thoroughly examined.

The blood is also exhaustively examined.

The author did not have at hand the apparatus necessary for determining the blood-pressure so that the effect of the treatment upon this condition is not described in the book.

Twenty-six cases are described in detail in this book. They were poor people for whom rest, superalimentation and open-air cure were not available and nine of those who were actually cured were engaged in very arduous work.

Seven cases which were considered from the start to be incurable were submitted to the treatment and were all greatly benefited both symptomatically and as shown by the study of their physiological chemistry. Some of these have succumbed to the disease and others are still under treatment.

Thirteen of the other cases were cured and have remained so: some for three years after the treatment and others for shorter periods.

The other six patients have all been benefited and some of them are apparently going to get well.

All the patients continued at their regular occupations and none of them received any medicine.

The book gives an interesting and valuable account of the benefit produced by high frequency currents in some cases of pulmonary tuberculosis. It gives a wonderfully complete idea of the physiological effect of high frequency currents.

It is to be regretted, however, that the author says nothing about the frequency or duration of the applications and nothing about their nature except that they consist in high-frequency effluvation.

S. T.

Surgical Suggestions. Practical Brevities in Surgical Diagnosis and Treatment, by Walter M. Brickner, M. D., chief of Surgical Department, Mount Sinai Hospital Dispensary, New York, Editor American Journal of Surgery, and Eli Moschcowitz, M.D., Assistant Physician, Mount Sinai Hospital Dispensary, New York, Editorial Associate, American Journal of Surgery, Duodecimo; 60 pages. New York: Surgery Publishing Company, 1906. Cloth, 50 cents.

These "Surgical Suggestions," which were published in successive issues of the *American Journal of Surgery*, have been gathered together in a single volume in order that they may be more accessible for reference, and may reach a larger audience. The little book does not profess to form a complete treatise on surgery, but it does contain a collection of 250 well established facts of surgical science.

Every general practitioner ought to have a thorough knowledge of the principles of surgery, although he may have resolved never to treat a surgical case. And yet it is practically impossible for one who does not frequently come in contact with surgical cases, to remember constantly all the well established principles. To such physicians a book of this kind is of great value as it enables him in a short time to review many of the more important facts in surgery.

This volume resembles somewhat "Golden Rules of Surgical Practice," by E. Hurry Fenwick, of London, the third edition of which was published by William Wood & Company, in 1893, but differs from the latter, in that some of the suggestions have reference to the technique of the newer operations.

"Surgical Suggestions" is handsomely published, but if the elegant margins had been in part sacrificed, it might have been put out in a size which would have adapted it to the practitioner's pocket, so that he might make it his companion to read at odd moments while waiting for horse or train. Even broad as are its covers he may profitably keep a copy in his library, and read it every six months.

G. E.

Practical Dietetics with Reference to Diet in Disease. By Alida Frances Pattee, graduate Boston Normal School of Household Arts; late lecturer in Dietetics, Bellevue Training School for Nurses, Bellevue Hospital, New York City; special lecturer at Bellevue, Mount Sinai and the Hahnemann Training Schools for Nurses, New York City. Third edition, A. F. Pattee, publisher, 52 West Thirty-ninth Street, New York City, 12mo., cloth, 300 pages. Price, $1.00 net.

This little volume, dedicated "To the Trained Nurse: Whose daily life is a blessing to humanity," contains a large amount of information of great importance to all physicians, but with much of which many of them are unfamiliar.

Sixteen pages are devoted to the chemical constitution of food in general, with a brief account of digestion.

The next seven pages contain some general remarks on the principles of feeding in acute diseases. Then follow directions for the arrangement of the invalid's tray, and for making measurements of the various ingredients used in preparing his food.

The subject of drinks, hot and cold, is next taken up, and minute instructions are given for the preparations of those of acid, albuminous, starchy and miscellaneous characters.

Thirteen pages are occupied with a description of the uses of and various methods of preparing milk. Beef preparations, broths, beverages, including tea, coffee, cocoa and chocolate, soups, meats, gruels and breakfast food are next taken up, and clear and explicit directions are given for their preparation.

Then follow, in order, fruits, toast, shell fish, including oysters and clams, birds, including quail, squabs, grouse and chicken; sweet breads, eggs and omelets; fish, meats, vegetables, vegetable sauces, bread of all varieties, sandwiches, crackers, salads, nutritious desserts, such as soft custards, baked custards, whips and souffles, junket, custard, rice, tapioca and bread pudding sauces; gelatin, jellies, cakes, frozen desserts, including ice cream, sherbet and ices. Each subject is illustrated by numerous recipes, so that this part of the volume resembles a cook book. In fact, housekeepers and cooks would find it a useful guide in preparing wholesome food for families.

The remaining one-third of the book is occupied by an account of the diet suitable for different diseases. The subjects are taken up in this order: Fevers, including convalescence, typhoid fever, the eruptive fevers and pneumonia, diabetes, excess of uric acid, gout, rheumatism, obesity, phthisis, dyspepsia, constipation and diarrhœa, gastritis, ulcer of the stomach, dysentery, appendicitis, Bright's disease, nervous disorders, pregnancy and infancy.

This part of the volume resembles a scrap book, being composed mainly of extracts from the writings of such distinguished dieto-therapeutists as Dr. William Gilman Thompson, of New York; Dr. Frederick C. Shattuck, of Boston; Dr. N. S. Davis, of Chicago; the late Dr. J. Milner Fothergill, of London; Dr. Max Einhorn, of New York; Dr. H. S. Vickery and Dr. Elbridge G. Cutter, of Boston; Dr. Henry Koplik and Dr. L. Emmet Holt, of New York, and Dr. Louis Starr, of Philadelphia. It also contains copious reproductions of the diet tables in use at the Massachusetts General Hospital in Boston, and at the Bellevue and Presbyterian Hospital and the Society of the Lying-In Hospital in New York.

This part of the volume may be of use for reference to those who have not the complete works of Thompson, Fothergill, Davis and Koplik, but the information contained in it is not sufficiently digested to serve as an authoritative guide to the physician, and is so ample that there is danger that the nurse who reads it may become overwise in regard to details of treatment which should properly be directed by the physician.

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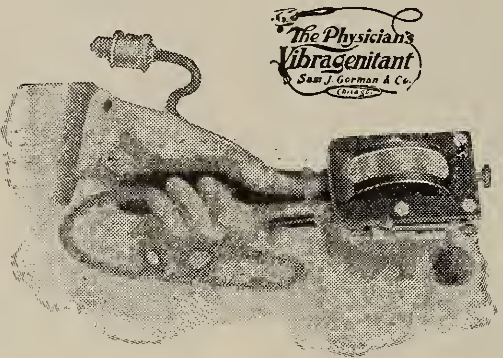

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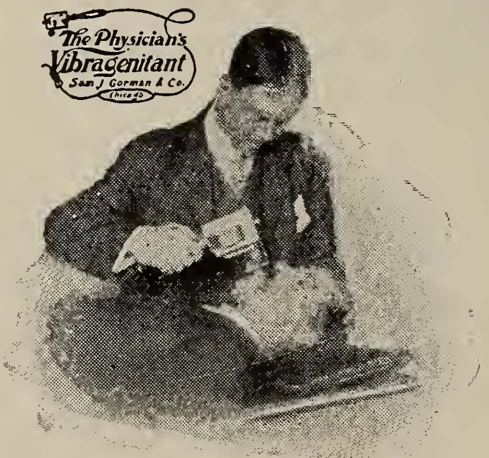

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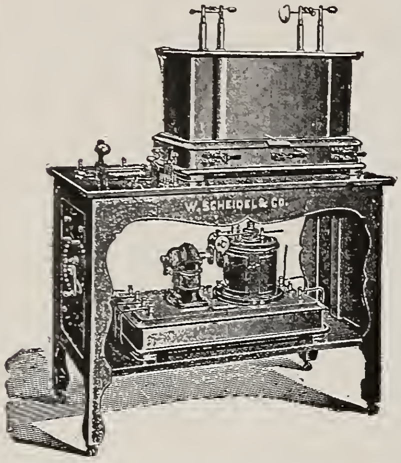

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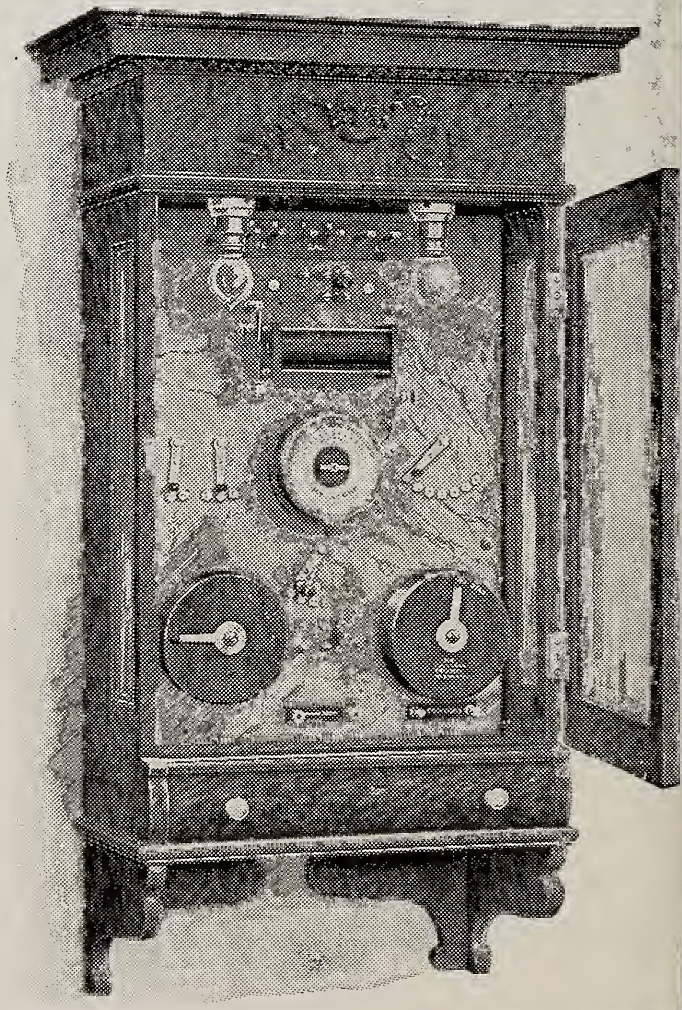

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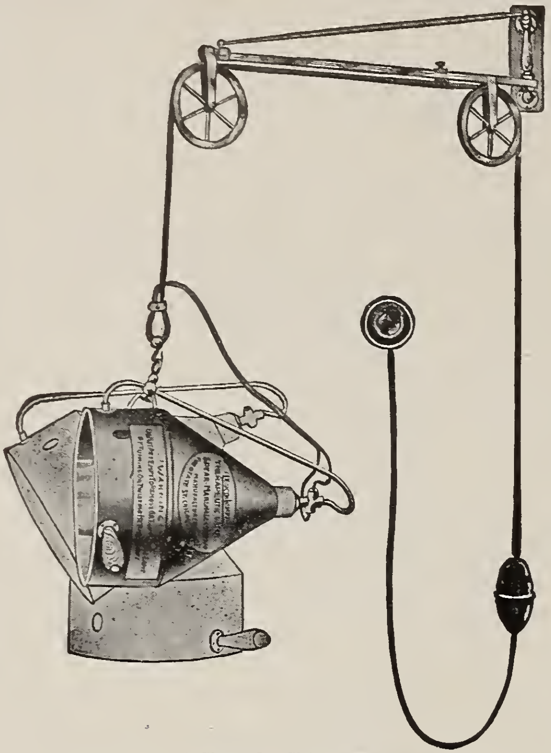

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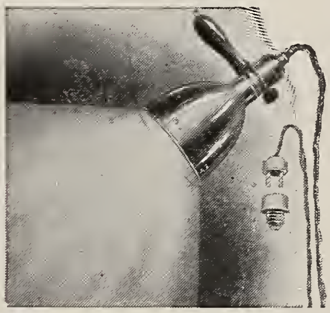

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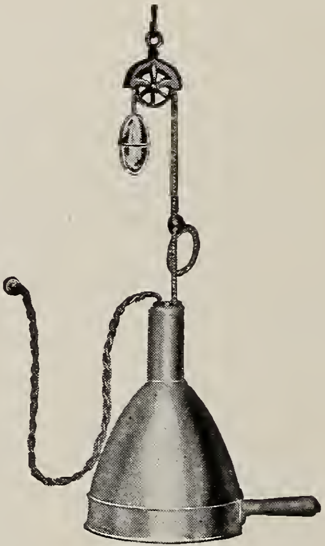

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VOLUME IV — NOVEMBER, 1906 — NUMBER V

THE ROENTGEN RAY TREATMENT OF CARCINOMA*

BY GEORGE HENRY STOVER, M. D., OF DENVER, COLORADO

*Lecturer on Radiology and Electrotherapeutics in the Denver and Gross Medical College, Denver;
Radiologist to St. Joseph's and the City and County Hospitals, Denver*

IT is now a well-established fact that the Roentgen ray has curative properties which are of use in many pathological conditions. We have passed the time when debate on this proposition is called for.

Now our attention is more given to methods and technique. When your secretary asked me to present a paper on the subject announced, he voiced this feeling by asking that it be not clinical except as made necessary for illustration of points. Let me say that I feel highly complimented in having been asked to present my ideas to such a body as this, and it is with a great deal of pleasure that I have made the trip from Denver to meet you.

I began using the Roentgen ray early in 1896 when but little was written on the subject, and I was not surrounded by colleagues in the same work with whom I could exchange ideas and discuss discoveries; in other words I had to " sweat it out by myself :" therefore my technique has been largely of my own development. It has been a source of great satisfaction to me on my previous visits to your Eastern cities, to find that I had fallen upon methods similar to those used by the men here, who had larger opportunities than I to test them; therefore I probably have nothing new or startling to offer you.

In making some nine thousand therapeutic applications of the Roentgen ray, I have made use of Scheidel twelve-inch and sixteen-inch coils, Heinze twelve-inch coil, Carstarphen six-inch, twelve-inch and fifteen-inch coils, three Kinraides, a six-inch Meyer coil, and static machines. Some of the coils have been operated on the alternating current at one hundred and ten volts, others on the direct current at two hundred and twenty volts, and some by storage batteries; as interrupters I have been using all kinds, commutator breaks,

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Read at the Sixth Annual Meeting of the American Roentgen Ray Society, at Baltimore, Maryland, September 28-30, 1905.

hammer breaks, mercury jet and electrolytic with acid or alkaline solutions. I have tried every type of tube, almost, that I know of; those with vacuum regulation are preferred and by choice those of the automatic type.

The most important question we now have to deal with relates to the measurement of Roentgen energy. A number of men have devised apparatus for the purpose. It is claimed by some that no standard dose can be established, by reason of the fact that normal tissues of different individuals are not alike in their susceptibility to the rays, thus giving rise to the belief in an idiosyncrasy in certain individuals, rendering them very liable to Roentgen ray burns. I do not believe this is of much importance. I believe there is less of an idiosyncrasy to the Roentgen rays than there is to drug action, and we certainly recognize a standard dose in drug therapeutics. I am almost willing to state dogmatically that the reported cases of idiosyncrasy are those in which a low tube has been used, close to the skin, and before any one disputes this statement I want him to be extremely sure of his grounds.

The measuring apparatus which has so far been presented is open to many objections. All of them are too costly and too complicated, some of them are cumbersome and would require too much time for adjustment with varying positions of the tube; the reading of some would be unfavorably affected by the presence of the radium in the office, or by the influence of other electrical apparatus in action near them. Some would not give the same reading under different conditions of the air with regard to the presence of varying amounts of dust or moisture, and altitude might be a disturbing factor. The discs of barium-platino-cyanide change color partly by dehydration it has recently been stated, hence the readings would be very different in Colorado from those in New York. The readings of those which measure the amount of current passing into the tube, with a control measure of parallel spark, probably do not truly indicate the actual output of rays because the walls of tubes vary so in thickness and in the composition of the glass used.

I think I have learned to estimate the amount and character of the rays being produced by considering a number of factors, among which are amount of primary current, rate of interruption, kind of interrupter, character of wire and winding of secondary coil, tests of parallel spark-gap, the visible fluorescence of the tube, and very rarely a glance through the fluoroscope. All this sounds very cumbersome and time-consuming, but really the process is almost an unconscious cerebration. When a measuring instrument comes, convenient to use, uncomplicated and not of delicate construction, subject to few disturbing factors, and of reasonable price, I shall welcome it.

I simply try to get a ray of good mellow quality that will penetrate the tissues to be affected; it is from a rather lower vacuum than I would use in radiography of tissues of the same thickness. The rays of high vacuum tubes seem to me to be rather tenuous, and not to have as much chemical action as the others. It seems best not to get the tube too close to the skin as there are apparently rays, or an influence of some kind close to the wall of a tube, of rather high destructiveness and not easy of control. The rays should not be confined too closely to the actual area under treatment, but should be permitted to affect the surrounding tissues to a reasonable distance.

It is well to protect the eyeballs and the hairy portions of the face and head when they do not particularly need treatment; in most cases the testicles or ovaries ought to be protected. It is possible that a long series of applications reaching the internal ear may damage the hearing, but I do not know that this has happened. In making applications to the glands in the neck there may be danger of unfavorably affecting the pneumogastric, and in the treatment of carcinoma of the breast I have sometimes wondered if there was danger of injury to the lungs or the heart muscle. Case No. 2 of my series received a long course of treatment for Paget's disease of the nipple, complicated by carcinoma; she completely recovered, but about a year later took a long walk in a hard storm, contracted pneumonia and died; her cancer was in the right breast, the pneumonia was in the right lung, an ordinary acute attack. Case No. 20 had been operated for carcinoma of the left breast, the Roentgen ray applied to prevent a recurrence, which, however, occurred; a second operation was done, there was an immediate recurrence attended by extensive ulceration when she again came to me. She was rayed for a time and while still under treatment developed what seemed to be an erysipelas of the skin of the body and arm on the left side; it was certainly not a burn for it first appeared on the arm, which had received no exposure at all. Within a very short time she had pneumonia of the left lung and died. Case No. 136 was supposed to be a very extensive example of carcinomatosis; both breasts were shrunken and indurated, and there was induration of the glands in each axilla and on both sides of the neck. No miscroscopic examination was permitted, so I used the Roentgen ray, but at the same time advised that she receive iodide of potassium. She recovered from the original condition completely, but soon had a severe attack of cardiac difficulty, and was in quite a precarious condition for a time.

I have seen her quite recently and learned that her heart had given her no trouble for some time; in looking her over I found what seemed to be a rather typical gumma of the skin.

Cases Nos. 23 and 216, both of them very small and very thin women whom I have treated for recurrent carcinoma of the breast, have had symptoms resembling muscular rheumatism; one of them had been subject to the same symptoms before taking the Roentgen treatment.

In treating carcinoma covered by healthy skin, it does not seem necessary to produce a dermatitis; in the cases that do best there occurs a slow atrophy of the skin, at times accompanied by pigmentation. The operator should be on the watch for an erythema that appears from two to six hours after an exposure, when a number have been given; an erythema that will have disappeared by the next day as a rule; when this has taken place a few times, it is well to omit exposures for a time or place longer intervals between them. In superficial carcinoma a little dermatitis does no harm, and is at times apparently of benefit.

I usually make applications three times a week, as this plan gives one a better control of reaction than when daily exposures are given. The average length of an exposure is ten minutes, and the tube is practically never less than eight to ten inches from the skin.

It is probably a good plan to send the rays into the tissues from different points during a course of treatment.

I use Friedlander shields on most of my tubes, to protect parts which it is not desired to expose, and also to keep the rays from reaching my assistant or myself.

As about ninety-nine per cent of my work is with referred cases, the diagnosis has usually been pretty well settled before they come to me. A microscopic examination has generally been made at the time of operation in the post-operative recurrences that I see. In the primary cases I do not much like to urge the removal of a portion of the growth for examination as I have a strong dislike to have incisions made into the body of these growths; I hope you can convince me that this feeling is a mistake. If occasionally I cannot differentiate between lupus, carcinoma of the skin, and rodent ulcer, I have the satisfaction of knowing that the Roentgen ray is the thing to use, even if I am not sure as to the name of the condition I am treating. I feel that I must subordinate my scientific interest in the case to the interests of the patient.

In carcinoma of the skin without involvement of neighboring glands I think the Roentgen ray is as nearly a specific remedy as we can expect to possess. I have caused the entire disappearance of secondarily-infected glands in several cases, which leads me to view the application of the ray to carcinomatous glands in certain primary cases with rather more favor than has been my habit in the past; yet I think we should be very conservative about recommending the Roentgen ray for glandular cases. In the case of Paget's disease above referred to, there was an enlarged and indurated gland just beyond the axillary border of the pectoralis major, which gland entirely disappeared under Roentgen therapy. Case No. 179 was a post-operative recurrence in glands on the side of the face and in the neck following the removal of a carcinoma of the skin just in front of the ear. Roentgen therapy caused the entire disappearance of one of them; some others were removed by operation and I had them examined by Dr. Wilder, who reported that the epithelial cells in one were very few, and that in another they showed distinct evidence of degeneration; there was a clear excess of connective tissue present. Case No. 94 was that of a young man only twenty-five years of age, who had a tumor of the lip; this was treated by a dermatologist who attempted to remove it with paste; it promptly recurred; the paste applications and recurrences were repeated several times. I gave a large number of Roentgen treatments with apparently no good effect, so the growth was excised; microscopic examination showed it to be malignant, but I was unable to get any information as to pathological details. The glands under the jaw became involved, and after a course of raying I asked to have them removed; the microscopic examination of these revealed considerable evidence of degeneration in the epithelial cells, and they could hardly be stained.

When I am consulted by a person who has a carcinoma beneath the skin, my position is as follows: I always advise treatment by the Roentgen ray of primary non-operative and recurrent non-operative cases; the percentage of success will always be very small in these classes of cases, but they come to us as a last resort, and we must do what we can for them, even though it is only to keep them out of the slough of despond into which a surrender to their fate must plunge them, or to lessen present misery in the hope of future benefit until kindly

Nature obtunds their senses as the end approaches.

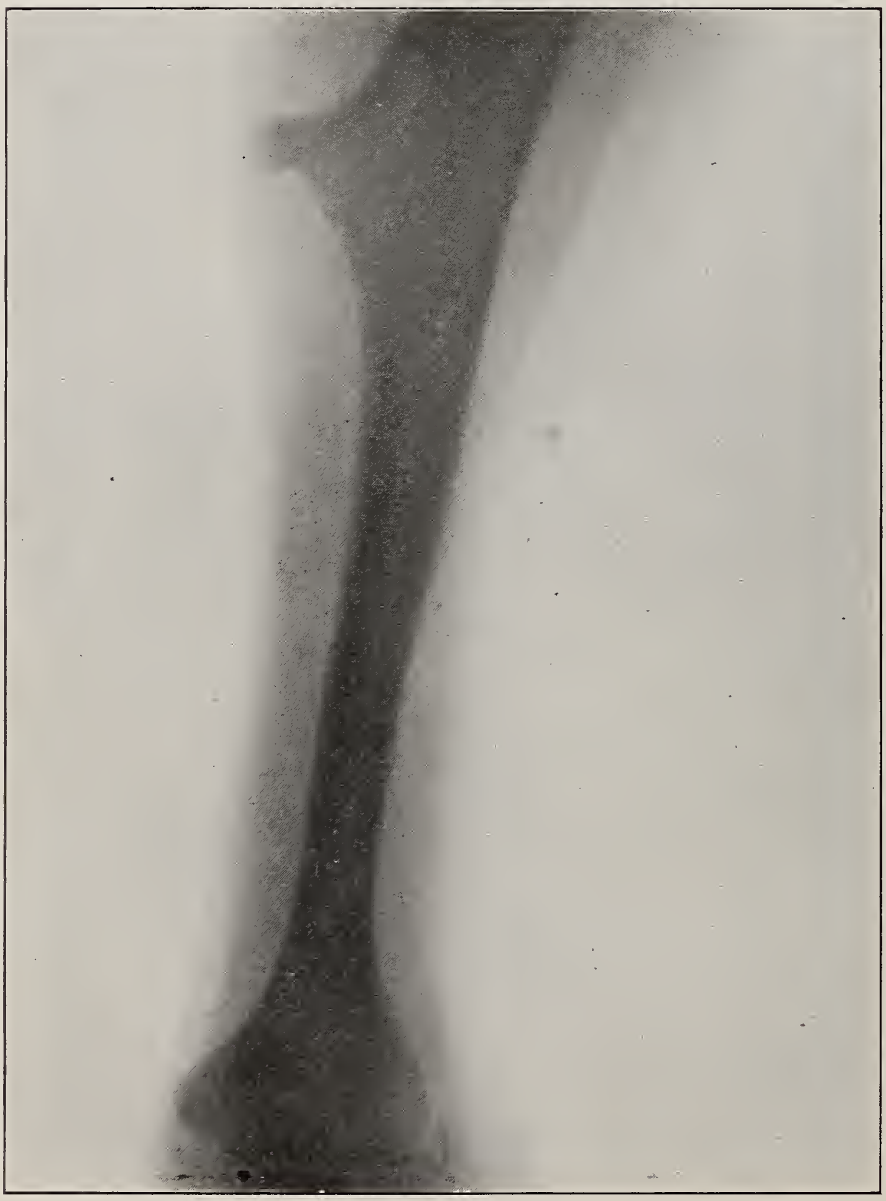
In the case where it is an equal choice between Roentgen treatment and surgical measures, I feel that Morton's suggestion of the use of fluorescin in conjunction with Roentgen therapy has to a certain extent led me to believe that perhaps I may somewhat modify my former conclusions. It seems to me that since I have been using fluorescin my results have been rather better than before. I formerly absolutely refused to treat any operable case of carcinoma beneath the skin; at the present time I say that I believe it my duty to advise operation and strongly urge it; if then the patient positively declines operation, I consent to treat them for a time, but I demand that there be present a considerable margin of safety, so that if operation is needed later its success will not have been imperiled by the delay in resorting to it, and in talking to such a patient I never lose sight of the fact that an operation may be needed later; if such a case shows improvement, it is well; if it must come to operation, I have not done harm. Indeed, it is quite probable that a preliminary raying is of benefit.

I believe that Roentgen therapy should be made use of after operation, but I am unable to decide when it should be applied, whether immediately after operation in order to prevent a recurrence, or whether one should wait until a recurrence has manifested itself. My own experience with the prophylactic treatment has resulted in failure; a recurrence has taken place in a majority of such cases, though not in all; I am inclined to believe that the treatment was not continued long enough, and perhaps also was not sufficiently vigorous. I shall continue to make prophylactic use of the ray for a time, in view of this belief, until more data have been obtained.

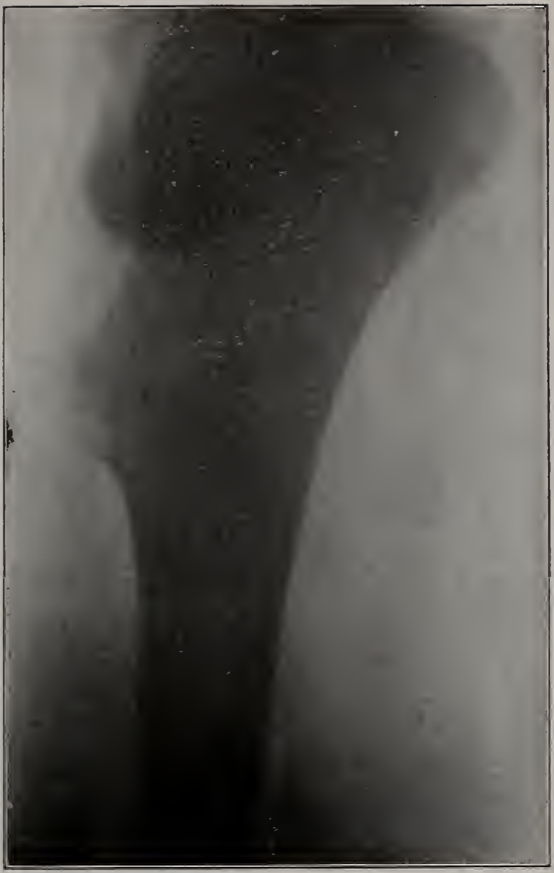
Case No. 23. Referred by Dr. Leonard Freeman. Mrs. G. Van B., aged thirty-six. A sister has cancer of breast. Five or six months before coming to me this patient found a small lump in her right breast. A complete radical operation was done and two months after the operation she was referred to me for prophylactic treatment. Treatment was given once a week for six months, stopping January 31, 1903, there being no evidence of recurrence. In October, 1903, she came to me, having had two recurrent points of disease removed, one in a gland in the axilla and the other a small mass formed about a piece of ligature that had been left. Treatments were given on alternate days during the month of October, then omitted until December, and continued until February, 1904, when she went East on a visit. After her return she suffered great pain in the back and chest, and was supposed to have spinal involvement; there were indurated glands in the axilla and neck on the right side, and a lump appeared in the left breast; the case appeared hopeless, but treatments seemed to reduce the size of the glands, and the lump in the breast almost disappeared; her pain was so great and her general condition so bad that it seemed useless to continue, as she was hardly able to get to the office; there were some indurated glands in the neck on the left side. Since that time, it is nearly a year now, the progress of the disease seems to have been arrested, she still has pain, but it is not so severe as formerly, and she is able to do a good deal of her housework, her husband tells me. There is no doubt about the diagnosis in this case, as several microscopic examinations were made at different times. I do not think I treated her long enough when she first came to me, or often enough by a good deal. It is almost miraculous that this patient is alive today; when I discontinued treating her, we all thought she could not live more than a month or two.

SKIAGRAPHIC STUDIES OF EXOSTOSIS
FIVE SPECIAL PLATES

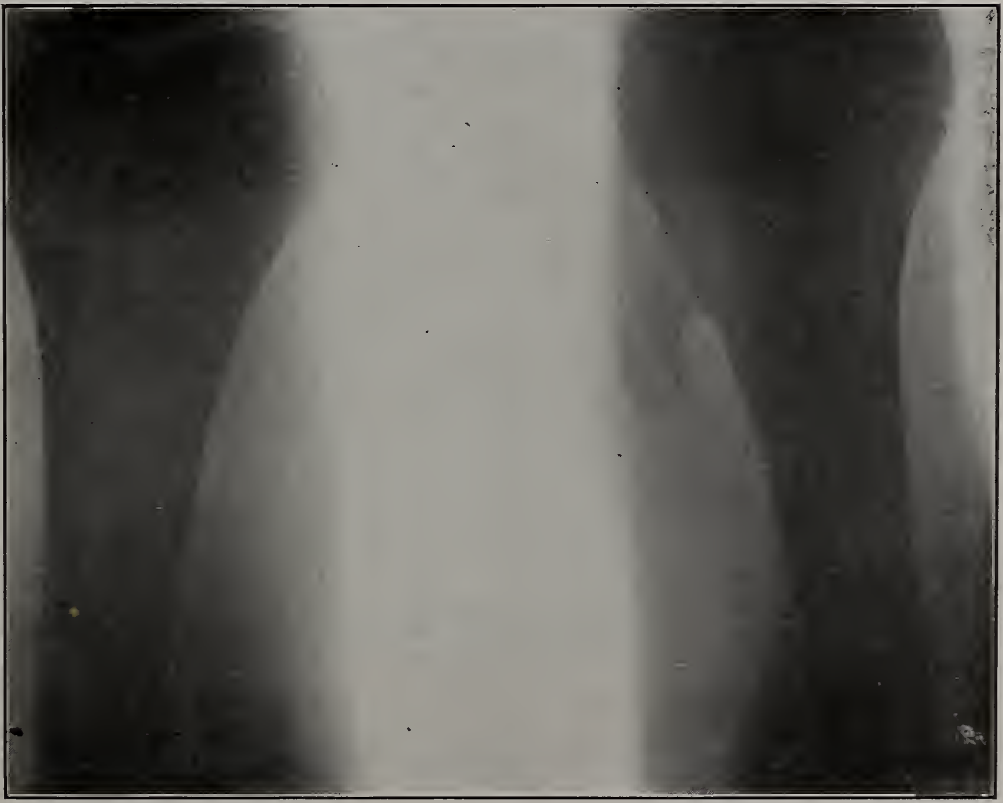
BY CARL BECK, M.D.



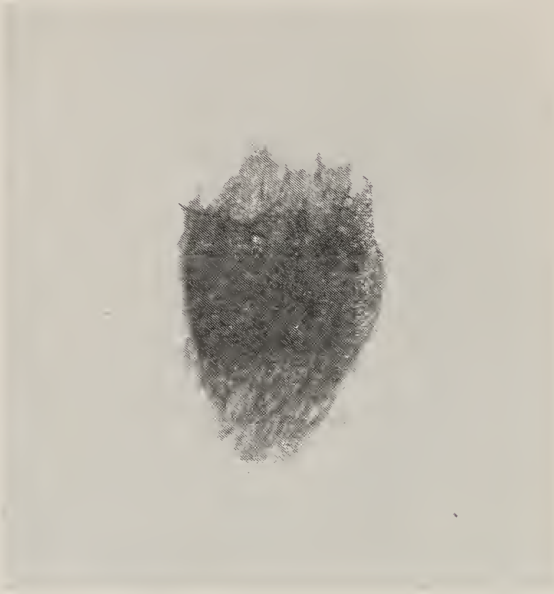
Exostosis of Humerus in a boy eight years old.



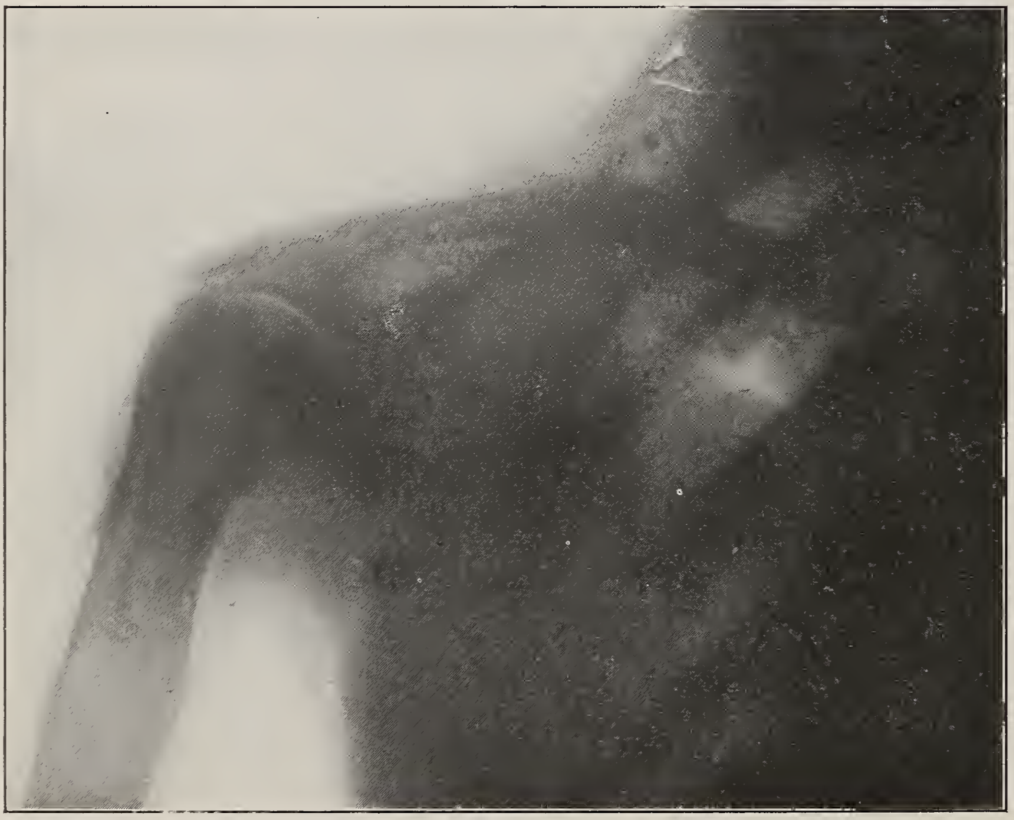
Exostosis on the outer side of the femur in a girl thirteen years old. Removed surgically.



Exostosis at the lower third of the femur in a boy ten years old.



Texture of Exostotic Fragment (see skiagraph below) skiagraphed after removal.



Exostosis of Humerus and Scapula in a girl fifteen years old. Mark enormous protuberance at the spina scapulæ.

Two Cases of Glycosuria Submitted to High Frequency Currents without Change in the Glycosuria or in the Nitrogenous Matters or the Chlorides. (*Drs. Widal and Challamel, Archives d'Electricite Medicale, August* 25, 1906.) Autoconduction. Strict dietary regulations for a time long preceding the electrical treatment. Gaiffe's portable outfit, 9 storage cells, 17 volts, 40 centimetre Ruhmkorff coil with Gaiffe's atonic interrupter, average primary current 6 amperes, d'Arsonval plate condenser with four sheets immersed in petroleum, spark-length from 33 to 43 millimetres, movable cage of 20 continuous turns of wire which was traversed by an oscillating current of 540,000 frequency as shown by the ondometre made by Gaiffe after designs by Captain Ferrie.

First patient a man 52 years, abscess of the leg and 193 grammes of sugar in the urine in 24 hours without special diet. Under a very strict diet this fell to a point where the total amount was only three or four or five grammes a day. This treatment took 36 days and was strictly followed after the high frequency treatment was begun. Ten seances of autoconduction (one of five minutes, four of ten minutes, two of twenty minutes, one of forty minutes). First six were every day and the remaining four distributed over two weeks. No change in the amount of sugar, the quantity of urine remained the same (2500 to 3000 grammes) except a very slight increase on one day. No special change in quantity of urea or chlorides. Slight increase in acidity at first but returned to its original figure during the later treatments. No change in arterial tension which oscillated between 17 and 18 mm.

Second patient a man 57, without kidney lesion but with enlargement of the liver which had subsided under hospital rest and diet, and with a trace of sugar on admission. This disappeared at once under partly milk diet. Given 125 grammes sugar on an empty stomach and in eight hours excreted 0.22 grammes of sugar in the urine. Three days later the same experiment but applications of autoconduction cage begun at the same time, five minutes every half hour for three hours. It was found that 0.28 grammes of sugar were excreted in eight hours and the quantity of urine was 3.9 litres as against 2.6 litres in the first experiment. A third experiment the same as the first gave 0.21 grammes of sugar in eight hours.

S. T.

Treatment of Keloid by High Frequency Effluviation. (*P. Redard and S. Barret, Annales d'Electrobiologie et de Radiologie, July,* 1906.) The case was of six months' standing following a burn of the forearm in a child seven years old. Monopolar Oudin resonator excited by 35 cm. coil. At first a condenser electrode with a glass collar and later MacIntyre's vacuum electrode. In contact with skin four or five minutes and then for last few seconds held at a distance to give a shower of sparks. A slight crust formed in two or three days and came away in eight days. Part treated and neighborhood brownish tanning. Treated once a week for three months, then twice a week for the remainder of almost a whole year. After twenty treatments there was great improvement in every particular and at the end of the treatment there was a complete cure. Little keloidal nodules not directly treated had also disappeared. *S. T.*

Results in Treatment of Diabetes at the Apostoli-Laquerriere Clinic by High Frequency Currents. (*Dr. Laquerriere, Archives d'Electricite Medicale, August* 25, 1906.) Thirty-four cases treated since 1894, ten cases not reported in full because of only a couple of treatments or some intercurrent malady or because of some other line of treatment. Twenty-four cases without change in this previous regimen (at first Gaiffe's 25 cm. coil with d'Arsonval rotary interrupter, subsequently 35 cm. coil, and recently Gaiffe's large apparatus for use with the alternating current). Treatments three times a week for 15 minutes with either cage or the couch.

Results. 1. Always well borne if duration and frequency are regulated to suit the case. 2. Almost always improvement in general strength. 3. Frequently a diminution of the diabetic symptoms and sometimes a symptomatic cure. 4. The influence upon the sugar is less constant, sometimes reduced but more rarely increased. Often enough it shows the same variations as before the treatment was instituted. *S. T.*

Two Cases of Herpes Zoster Cured by High Frequency Effluviation. (*G. Ronneaux, Annales d'Electrobiologie et de Radiologie, July*, 1906.) One case of eight days' duration (five days of eruption) completely cured in a week by three treatments (pain all gone and vesicles dried up). Another case had been under treatment for colitis and developed an eruption and itching in the axilla which proved to be thoracic herpes with discrete vesicles of medium size. One treatment cured this case.

From lower pole of Oudin resonator a wire attached to a handle is held by patient's hand. The effluviation is as intense as possible, but without the production of sparks. Metal brush from other pole of resonator.

S. T.

A Case of Fistula in Ano Cured by High Frequency Currents. (*G. Ronneaux, Annales d'Electrobiologie et de Radiologie, July*, 1906.) The patient, a woman of thirty with pulmonary tuberculosis, had had a fistula two years previously which was cured by a surgical operation after thermocauterization had failed. The present fistula had existed for three or four months; it was a blind external one with such an abundant discharge as to soak through a menstrual pad and all the patient's clothes if she sat still for any length of time, as at the theatre. Treatment by Doumer's conical metal electrode in the anus and connected with the upper pole of an Oudin resonator, rather a strong current being used for ten minutes. Eleven treatments at irregular periods caused a complete cure in six weeks and the patient was still well when last seen four weeks later. *S. T.*

High Frequency Currents in High Arterial Tension. (*Dr. Vaquez, Archives d'Electricite Medicale, August* 25, 1906.) His conclusions are that they do not produce a lowering of the arterial tension and that the reduction which some observers have noted were due to rest, diet, etc. *S. T.*

The Measurement of Faradic Currents. (*Wertheim Salomonson, Annales d'Electrobiologie et de Radiologie, July*, 1906.) This is an article thirty-two pages long in which every aspect of the question is scientifically discussed. His conclusion is that for practical purposes Edelmann's faradimeter is sufficient. *S. T.*

Experimental Researches on Liquid Contacts. (*Dr. Chanoz, Annales d'Electrobiologie et de Radiologie, July*, 1906.) This is a continuation of a scientific study of the electromotive power generated by the contact of different liquids. Electric currents produced by vital processes in living bodies are of this nature, hence the interest of the subject to the electrobiologist. *S. T.*

The Electrical Resistance of the Blood and Urine as a Test of the Functional Efficiency of the Kidney. (*Dawson F. Turner, London Lancet, July* 28, 1906.) The following comment upon this article, which was abstracted in the **October Archives,** appeared in a recent number of the *London Lancet*, and as facts can be ascertained only by free discussion, we reprint it in full:

To the Editors of the Lancet,

Sirs,— My attention has been called to a research by Dr. Dawson F. D. Turner, published in the *Lancet* of July 28, 1906, p. 223, under this title. It is quite impossible to obtain a measure of the concentration of a specimen of blood in salts by measuring the electrical resistance of the blood as Dr. Turner supposes. It has been shown by various observers — first of all by Professor G. N. Stewart (1) and Roath (2) independently of each other — that the coloured corpuscles are practically non-conductors owing to their impermeability to the ions of plasma.

The conductivity of blood depends not only on the salts of plasma, but on the relative volume of corpuscles and plasma (3). The reason why Dr. Turner obtains so marked a diminution of resistance in blood in pernicious anæmia is because the number of corpuscles is so greatly reduced. It is only by measuring the conductivity of the serum that any notion of its richness in salts can be obtained. I have published results of conductivity measurements (4) and freezing point observations on blood and serum in numerous diseases. In pernicious anæmia (three cases) I found no warrant for concluding that the proportion of salt is increased.

I am, Sirs, yours faithfully,
Thos. Matheson Wilson,
B. A. Toronto, M. S. Chicago.
Physiology Department, University of
Chicago, August 18, 1906.

RADIODIAGNOSIS

On the Examination and Interpretation of Radiographs. (*John Hall-Edwards, Archives of the Roentgen Ray, September*, 1906.) Edwards believes it necessary in every case to study the plate itself, as no printing paper can possibly give all the beautiful detail shown in the negative. Moreover, a photographer in making such prints will print for some certain point in the negative to the detriment of other important details and it is often possible to print out certain things which, to the eye of the competent observer, are perfectly plain in the negative itself. To send a print to a surgeon who is not trained in the reading of radiograms is an injustice unless the print is accompanied by a written diagnosis and a diagram of the conditions present. A diagnosis should never be made from a negative until it has been carefully compared with a good negative of the same part under normal conditions, and a set of normal negatives should be part of the equipment of a radiographer, for such comparison.

A large sheet of ground glass in the window of the dark room makes an excellent place to study negatives, but where this is not obtainable a photographer's retouching desk may be employed. If the plate is of extreme thinness it may be intensified, remembering, however, that intensification always coarsens the grain of the plate. A thin negative may be laid face downwards on a sheet of white paper, and studied from different positions and angles and much derived from it. Ordinarily, however, where a negative is so thin it is better to make another good one.

The interpretation of a radiograph can be properly made only by one who is experienced in reading plates, who is perfectly familiar with the normal radiographs of the part under examination, and who is also familiar with the conditions under which the picture is made and the effects of distortion.

Mistakes are especially liable to be made in radiographs of the pelvis and hips, and in radiographing both hips, the thighs should be rotated inwards in order to avoid distortion between the neck and the shaft. In cora vara, however, rotation inwards is often impossible, the limb being strongly rotated outwards. Here each hip must be radiographed separately.

In viewing a radiograph of a normal knee for the first time the observer is at once struck by the position of the patella, which lies above the joint, whereas in text-books of anatomy it is usually shown covering the joint. So long as surgeons are contented to accept as evidence radiograms taken under unknown conditions by unskilled operators, so long will the road be open for mistakes, fraud and quackery.

The true position of the X-ray expert is not yet defined but it must be before real progress can be made.

In Austria, physicians only are licensed to operate X-ray machines. Aside from the danger of the production of X-ray dermatitis, errors may arise from unskilled manipulation, and improper interpretation of negatives. Physicians should never advise their patients to go and get X-rayed, but should always send such patients directly to a skilled and experienced operator, one of whom can be found in most large towns; and the surgeon who advises his patient to get a radiogram made by a chemist or a manufacturer of apparatus, or other unskilled person, does an injustice to the patient himself and to those members of the profession who have devoted sufficient time to this work to acquire the necessary skill and experience for its performance.

The value of the interpretation of a radiogram depends upon the knowledge and experience of the expert giving it. It has been admitted by the profession and by the heads of the Royal Army Medical Departments, that an expert in order to produce the best work must devote his whole time to it, since it requires a considerable amount of skill as well as constant practice. A surgeon must have considerable experience in the interpretation of radiograms before he is in a position to judge of the value of any special print submitted to him.

It has been claimed that a radiograph can show a fracture where none exists, but this is not true, for such a radiograph could not deceive an expert, who would detect the mistake at once. It is to be regretted that there has not been published an atlas of well executed radiograms, illustrating all parts of the normal human subject at all ages, from fœtal to adult life. Most mistakes are made when using the fluoroscope. Few are made when viewing properly executed radiograms. A green stick fracture or an oblique fracture of a long bone with little displacement may deceive one but this will not occur if two views at right angles are taken. One must remember that you cannot see through a key-hole until the eye is opposite it, and that the X-ray will not go around corners. The skillful interpretation of radiograms is the result of experience in the technique of production, in the reading of the pictures produced, and also the careful weighing of clinical evidence obtained by the older methods of examinations. *G. C. J.*

Upon the Diagnosis of Mediastinal Tumors with Reports of Cases and Roentgen Demonstration. (*Drs. Burdach and Max Mann, Fortschritte auf dem Gebiete der Roentgenstrahlen July* 24, 1906.) The usual symptoms of mediastinal tumors are pain, cough, with or without expectoration; increase in the pulse rate with occasional irregularity; difficulty in deglutition; occasionally difference in the size of the pupils; cyanosis; abnormal pulsation; displacement of the heart; abnormal or fixed positions of the head; abnormal prominence of a part of the chest; enlarged supraclavicular or axillary glands; current jelly sputum; abnormal areas of dullness; hoarseness. In the diagnosis of mediastinal tumors the screen is cheaper and more useful than the photographic plate.

The roentgenograph is made with the patient in the sitting or the recumbent position, and the plate may be placed anteriorly or posteriorly.

Bronchial glands in order to cast a shadow must be of considerable size and then will have the following characteristics: they will be sharply outlined and will be arranged in chains. After an examination in the antero-posterior direction the patient is turned obliquely and the area between the sternum and the spinal column is examined. It is important to decide whether any abnormal shadow shows pulsation. This would usually indicate an aneurism, but it must be borne in mind as stated by Holzknecht that 56 per cent. of aneurisms show no expansile pulsation. An aneurism of the beginning of the arch of the aorta is shown by an increase of the shadow beginning at the upper and the right border of the heart. It is not always possible to differentiate between an aneurism of the innominate artery and a sacular aneurism springing from the arch of the aorta or the ascending aorta.

Other mediastinal tumors will only give confusion when they are regular in outline, when irregular in outline they can be easily recognized.

G. E. P.

Urinary Calculus and its Detection with the X-rays. (*Edward W. H. Shenton, London Lancet, September* 15, 1906.) The detection of urinary calculus by means of the X-rays has become a generally recognized and valuable addition to surgical diagnosis. The method almost universally employed is the radiograph with or without diaphragm and apparatus for compression. It is with considerable interest therefore, that the communication of Shenton in the *Lancet*, for September 15, must be noticed.

His experience, extending over nine years and embracing 1600 examinations, compels attention to his remarks and has resulted in a technic which practically consists of a screen examination made with an enclosed tube stopped with a small diaphragm, the patient lying on a canvas couch, face downward, the tube beneath the couch at a distance of from four to six inches from the screen, the screen on the patient's back, the room dark or faintly illuminated with blue light, the complementary color to the illuminated screen. He says, " If any one will take a little trouble and study the screen method I am about to describe I feel convinced he will be surprised first, at how little he can see, second, at how much, and what assurance he will feel as to the presence of a stone when once he has seen it upon the screen and not as a mere smuggy mark upon a dismal looking radiogram." Further, " It should be clearly understood that because an object is not visible in a photograph it is not necessarily absent in the subject photographed. The skiagram may be too bad or it may be too good." Such pictures he terms " stone obliterating but pictorially excellent radiograms."

The surgeons desire skiagrams of large dimensions which must of necessity be lacking in exactness. Such a radiogram will show only the most opaque and obtrusive stones. The smaller the diaphragm, the more accurately defined the image. It is practically impossible to examine both kidney areas and the ureters radiographically when using a diaphragm of two-inch aperture, but if such a diaphragm be employed with a screen it is easily possible, while if a stone be so detected it is easy to replace the screen by means of a plate, whereupon a few seconds' exposure will produce a permanent record. Moreover, movement of the kidney is frequently so great as to interfere with the radiographic method whereas it is only an assistance when one is using the screen. It is necessary of course, that the operator should have been at least 15 minutes in the dark room before he is able to appreciate the screen findings. When one first looks upon the screen a dim circle of light is seen. This should be centered over the lumbar vertebræ and when the operator is able to see and clearly see the transverse process, he may be certain that no calculus of reasonable size and opacity will escape detection. The entire renal tract is now explored and whenever a suspicious shadow is seen the patient is directed to hold his breath.

If a part of the kidney is observed it should be noticed whether or no the kidney and the shadow move concurrently. If such is the case it is more than likely that the shadow is due to a stone in the kidney. The diaphragm should then be contracted and the object studied so as to make out its outline. Search should also be made as high as the last two ribs, having the patient breathe deeply so as to drive the stone from its hiding place behind a rib. It is always desirable to have the intestines empty of solids and as full of gas as possible.

The screen diagnosis of calculus has proven in the author's hands sound and profitable in a large series of cases and there has not been an incorrect diagnosis made by the author since this method was substituted for the former radiographic method, which he considers will fail in two-thirds of the cases examined. *G. C. J.*

Investigations Concerning the Muller-Barlow Disease. (*Eugene Fraenkel, Fortschritte auf dem Gebiete der Roentgenstrahlen, July* 24, 1906.) *Dr.* Fraenkel has made a complete study of the osseous system of a young boy, and re-examined him at intervals so that he could note the progress of the disease. He finds marked swelling of the epiphyses of the bones and thickening elsewhere. The case began with the symptoms of rickets and terminates with the symptoms of Muller-Barlow Disease. *G. E. P.*

The Production of Plastic Roentgenograms. (*Bela Alexander, Fortschritte auf dem Gebiete der Roentgenstrahlen, July* 24, 1906.) Alexander's method consists briefly in making a contact negative from the original X-ray negative; then a third negative is made from the first and the second together; then another or fourth negative is made by contact from the third negative, from which the print is made. *G. E. P.*

RADIOTHERAPY

Report of Two Cases of Varicose Veins Successfully Treated with the X-Ray. (*James C. McGuire, Medical Record, September* 1, 1906.) McGuire reports two cases in which roentgenization markedly benefited varicose veins.

The first occurred in a woman forty-five years of age who was suffering from eczema of both legs, complicated by varicose veins and an ulceration the size of a silver dollar on one leg. She was treated for several months with local applications and the eczema was cured, but the ulcer was intractable. He began roentgenizing the areas on March 30, 1906, using a medium vacuum tube at a distance of eight inches for five minutes every other day until he had given six treatments, when the patient complained of a severe burning sensation. There was much inflammation of the skin and the ulcer was angry looking. Applications were discontinued for four days, when the inflammation subsided and the rays were again applied once. The next day the part was found still more inflamed and crusted over, but during the following five days without any X-Ray treatment the dermatitis gradually subsided and had entirely disappeared by the end of the week. Ulcer had ceased to discharge and was reduced to the size of a ten-cent piece. At this time he also noticed that the varicose veins were growing smaller and smaller, and on May 20, two months after the treatment was begun, they had entirely disappeared and the ulcer was completely healed and covered with smooth scar tissue.

The second case was that of a man fifty years old who had an accumulation of varicose veins on the calf of his right leg about the size of half an orange, two or three inches in diameter. He began roentgenizing the lesion on March 31, 1906, using a medium tube forcing back a one-inch spark, at a distance of twelve inches, for ten minutes twice a week, until he had given ten applications at which time the tumor was noticed to be considerably reduced in size. Until June 4 the treatment was carried out every other day, gradually reducing the time and the distance of the tube from the lesion. It was then being applied at a distance of five inches for fifteen minutes. There has been only slight reaction, but the tumor has reduced fully one-half in size and the bluish discoloration of the skin is fading away.

McGuire expects that future investigation will show that the X-Ray is helpful in this condition through its power of obliterating blood vessels. He was first led to conceive that it might be useful by reports of cases of " port wine marks " which had disappeared after reaction to roentgenization.

The X-Ray in Splenic Enlargements. (*Charles Eastmond, New York Medical Journal, September* 8, 1906.) Eastmond believes that improvement in the blood condition will almost invariably result from exposure of a leucocythemic patient to rays of a low degree of penetration but that in order to secure a shrinkage of the spleen itself rays of a high degree of penetration generated by an old tube of high vacuum are required. The excitement of such a tube requires considerably more current than is usually employed. He has treated several cases of splenomegaly in which he found that the ordinarily employed dosage of the rays markedly improved the blood condition but produced little shrinkage of the spleen but that when rays of high penetrative power excited by an increased current were employed shrinkage of the organ progressed very satisfactorily. One of these cases is reported to illustrate this fact.

Action of X-Rays on the Sick Organism. (*Dr. Vaquez, Archives d'Electricite Medicale, August* 10, 1906.)

1. Effect of histolysis upon the abnormal cells, especially white cells of medullary origin in the blood. Also a similar but less marked effect upon tissues from which white blood cells originate.

2. In leukænia a more marked effect if the case is of slow development and the elements are more fully developed, more typical, more removed from sarcoma.

3. All the cellular elements in the blood in myeloid leukæmia may return to their normal qualitative and quantitative formula. Examination of the hematopoietic organs in cases considered cured have shown

myelogenous areas in full activity.

Conclusions are (1) that radiotherapy is the best treatment with which to oppose the development of leukæmia in any form; it is ineffective in the acute form; it holds the disease in check in the subacute and chronic forms. (2) Radiotherapy is only a symptomatic medication as far as shown up to the present time. Its too intense application may lead to grave accidents or unexpected change in the course of the disease. It should be discontinued after the disappearance of the pathological modification in the blood. (3) Methodical blood examination should be made before and during the course of treatment and also to detect recurrences. *S. T.*

Concerning the Dosage of the Roentgen Rays. (*H. E. Schmidt, Fortschritte auf dem Gebiete der Roentgenstrahlen, July* 24, 1906.) Direct methods of measurement include (1) the chromoradiometer of Holzknecht; (2) the radiometer of Sabouraud and Noire; (3) the measurement of the amount of rays absorbed by the change in color of the iodoform-in-chloroform solution; (4) Kienbeck's method with photographic papers; (5) Koehler's method of measuring the amount of heat generated on the glass wall of the tube.

As indirect methods we have the milliamperemeter, together with the measurement of the hardness of the rays by means of the Walter scale.

The direct methods have been found unreliable.

The indirect method is probably more exact especially when using a known tube that is giving good light and no inverse discharge. If under these conditions the milliamperage, the time, the degree of hardness, and the distance of the tube from the part are known, we have conditions that can be duplicated and similar results obtained. *G. E. P.*

A New Unit of Quantity of X-Rays. The Unit I. (*Drs. Bordier and Galimard, Archives d'Electricite Medicale, August* 10, 1906.) They use Freund's two per cent solution of iodoform in chloroform. The amount of iodine liberated under the action of the X-ray has been carefully determined and they have taken as the unit of quantity the amount of X-rays by which 0.1 milligrammes is liberated by rays falling normally upon a portion of the liquid one centimetre square and one centimetre thick. There are five different standard tints in Bordier's radiochromometer corresponding to 1, 3.5, 5.5, 10, 15 units I.

A unanimous vote was passed that "The section of medical electricity of the congress held at Lyons by the French Association for the advancement of science admits after discussion that with equal doses measured with the present indicators certain individuals under certain special conditions may present somewhat different reactions." *S. T.*

The Radiochromometric Mirror. (Like a similar device of Dr. George C. Johnston of Pittsburg, Pa.) (*Dr. C. Roques, Archives d'Electricite Medcale, August* 10, 1906.) The fluorescent screen with the radiometer is viewed in a mirror enclosed in the fluoroscope box and this enables the observer to stand at one side instead of in the direct path of the X-rays. *S. T.*

Phototherapy in General Practice. (*Herbert Pitcher, The Journal of Advanced Therapeutics, September,* 1906.) The author uses a five hundred candle power incandescent lamp excited by 12 amperes of current in his phototherapy work. He reports the following very interesting cases:

"A boy, nine years of age, whose ancestry on both sides was tubercular, was always a very delicate child. He had had two attacks of pneumonia and frequent attacks of bronchitis. A year ago last January he was operated upon for tubercular peritonitis and several enlarged mesenteric glands were removed. He did not react well from the operation and although he lived outdoors all the summer and autumn and received the best possible care, he remained weak and delicate. I saw him in October when he returned from the country. He had an evening temperature of one to two degrees above normal and very little appetite. He was easily fatigued, had some enterocolitis, and complained of his left thigh paining him. There was some lameness in his left leg—especially at night, after a little extra exercise. I ordered rest, most nutritious diet, and continued life in the sun and outdoor air when possible. As he did not improve after about six weeks, I sent him to Boston to consult an orthopedic surgeon. He said there was undoubtedly a tubercular focus in the hip-joint, and thought we had better continue present treatment a while longer.

"December 15 I gave him a light treatment, and from that time he has taken two treatments per week. After six treatments there was no pain or lameness. His general health improved rapidly, appetite became good, and bowels normal. At the present time I do not know of a more rugged-looking boy, he runs and plays all day and says he never gets tired, and never felt so well in his life.

"After the first two or three treatments the rays were applied as strongly as he could possibly bear, up and down the spine, to the abdomen and chest, to the left hip-joint and thigh. I continue the treatment only because his people wish to keep him well through the changeable spring weather. He has not coughed nor had a cold this winter, which breaks the record for him.

"A case of sciatic neuritis which resisted other forms of treatment was cured by the light. This was a very severe case which had existed about six months. The patient, a lady 50 years of age, was very much worn and debilitated by the constant pain which had kept her from taking proper nourishment and sleep. The light was applied to the spine, which increased the general metabolism and stimulated the nerve roots.

"Then the light was applied with all the heat the patient could possibly bear up and down the course of the sciatic nerve, and especially over the sciatic notch.

"A case of mastoiditis was cured in five treatments. This case, a woman, 36 years of age, had been treated a week by the usual remedies before I saw her. She complained of very severe pain in and around the ear and mastoid, with tenderness on pressure and pain on percussion over the mastoid bone. The membrana tympani was red and inflamed, and temperature 100.2 degrees, without chill.

"Application of strong light was made over the mastoid, in and around ear, side of the face, head, and neck of affected side for 15 minutes. She returned next day with report of a good night's rest, but some pain yet. Another application, the same as before, was made. The patient said there was absolutely no pain when she left the office, and there was no pain whatever after that. She received three more applications with complete subsidence of the inflammation, and there has been no trouble since.

" A man, 63 years of age, weighing 240 pounds, had the grippe, followed with severe pain in right side of his head and ear for three weeks. The last week the pain was so severe he could neither eat nor sleep. When I saw him he was a wreck. There was a profuse purulent discharge from the ear, the membrana tympani was ruptured, and the typical conditions with the symptoms of acute purulent otitis media. After thorough cleansing of the canal I applied the light for 15 minutes to the painful side of the head and neck, and into the orifice of the external meatus.

" The patient returned next day saying that he had had the first good night's rest for three weeks. He received six treatments with the result that pain and inflammation have entirely subsided, discharge has ceased, and the patient is feeling as well as usual. There has been no return of ear trouble."

He has also used this method of treatment in several cases of inflammation of the accessory sinuses with equal success.

Ultra-Violet Ray in Posterior Urethritis. (*A. S. Tuchler, The California Medical Journal, July,* 1906.) Tuchler recommends the following method of treating a persistent " morning drop":

Seat the patient on the insulated platform, insert an aseptic glass electrode into the bladder, attach it by an insulated cord to the positive side of the static machine, care being taken that the cord does not touch the patient; ground the negative side of the machine. When the proper connections have been made, start the machine slowly, the sliding rods nearly touching, gradually increase the speed of the glass plate machine to about 250 revolutions per minute, then separate the sliding rods to one and one-half or two inches, according to the sensitiveness of the patient. Ten to twenty minutes is the usual time of a treatment every other day. Usually from two to four weeks will suffice to effect a cure.

He considers that ultra-violet rays are generated by this application in sufficient quantity to accomplish this result and appears to consider that these constitute the active agent in the beneficial effect induced. He has used this application for three years and expresses himself as better pleased with it than any other method of treatment. If the urethra is too sensitive to tolerate the passage of the electrode he inserts a rectal tube into the rectum making the connections as above and claims good results.

Existence of Rays of Very Slight Penetration. (*Dr. Chanoz, Archives d'Electricite Medicale, August* 10, 1906.) Some rays from an X-ray tube will not penetrate the thickness of a sheet of paper. Belot suggested in the discussion that these were probably the " derma " rays. *S. T.*

Some Unheeded Principles Involved in the Dietetic Management of Infants during Hot Weather. (*Godfrey R. Pisek, New York, The Post Graduate, July,* 1906.) Park and Holt have reported, as a result of their investigations, that care is fully of as much importance as food in the reduction of sickness and death among infants in summer, and "that there seem to be many factors, but a consideration of the facts accumulated indicates that heat is the primary factor and that bacteria and their products are a secondary one, except when the contamination is extreme or pathogenic organisms are present."

The food during all seasons, summer and winter, is composed of fats, carbohydrates, proteids, mineral salts and water, and no matter what form the food may have it must contain all these elements if it is to sustain life continuously. But there is another very important, although intangible, ingredient embodied in the fat, carbohydrates and proteids, and that is energy, which plays an essential part in the life processes.

Physiology has taught that the waste products of food are excreted as feces, the oxidation products as carbon-dioxide and water from the lungs and that the end-products of proteid metabolism are eliminated as urea, etc., by the kidneys. The fact has not been clinically recognized that all the utilized energy of the food is transformed into heat, and as such must be eliminated. Heat is an excretion of the body as truly as urea is, and it has been calculated that if no heat were excreted for twenty-four hours the body would be at a pasteurizing temperature.

A few hours of heat retention might result in death, so the importance of the excretion of heat will be appreciated. A certain amount of heat is needed to maintain the body temperature, but all above this quantity cannot be utilized and must be excreted.

The energy expended in transforming food during the digestive processes and in its metabolism is liberated as heat. Also all the energy needed to keep the heart going, and in moving the arms, legs, etc., passes off as heat. Therefore to keep down the production of heat, light and easily digested food, and a minimum of body activity are essential.

It has been taught that a food should be judged by the amount of heat it can produce, or, in other words, the number of calories it contains. As only a small part of the heat produced from the food is needed to maintain body temperature in the summer time, and as the body cannot utilize heat as such, it is clearly fallacious to attempt to fix any standard for the number of calories a diet should invariably contain, or to judge a diet by the amount of heat it will produce.

Nearly one-third of the proteids of the food is used in preparing the other two-thirds for the body, and when proteids are used to supply energy, they produce about five times as much heat as the quantity of carbohydrates needed to produce the same amount of energy would liberate.

There are three ways in which heat is excreted: (1) by conduction, due to contact with colder substances; (2) by radiation, as when the heat passes off into the air; (3) by evaporation of perspiration, by which the sensible heat is rendered insensible, or changed into latent heat.

In winter and the cool months of spring and fall, when there is considerable difference between body temperature and air temperature, radiation will carry off the surplus heat as fast as it is produced, but as weather becomes warmer the difference between the temperature of the air and that of the body lessens, and sometimes there is not only no difference between them, but the air temperature is higher than the body temperature. In such cases heat excretion by radiation is slow or even impossible, and body temperature would rise above the normal unless some method of getting rid of the heat besides radiation were at hand. To meet this condition nature has provided that when radiation is insufficient sweating comes into play, and evaporation of perspiration is a most efficient remover of body heat.

When water passes into the state of vapor it absorbs a large amount of heat without raising its temperature. Evaporation of water and absorption of heat take place at all temperatures above the freezing point, but the amount of heat which is absorbed depends largely on atmospheric conditions and not alone on the warmth of the air. When the air is dry and warm, evaporation takes place rapidly and there is rapid absorption of heat; but if the air is damp and humid, evaporation is slow, and little or no heat is absorbed or rendered insensible. Evaporation is also very much retarded by salts in solution, and by the presence of fat or oil, which has an important bearing on the evaporation of perspiration which deposits salt and fat.

A relatively low summer temperature with high humidity is more trying than a much higher temperature with low humidity, because not enough heat excretion can take place with high humidity and moderate temperature, while with low humidity and high temperature the excretion of heat is extremely rapid. Under the latter conditions much heartier food could be taken soon after an attack of digestive disturbance than when the air is cooler but more humid. It is due to such differences of conditions that observers report so differently as to what diet is best after an attack of summer diarrhœa. Some advise a diet of light carbohydrates and a small amount of proteid in the form of gruel, cautiously adding milk as improvement sets in. Such a diet produces the minimum of heat and is adapted to atmospheric conditions characterized by humidity. Others advise a return to milk mixtures after the infected food has been removed. This may be done when the humidity is not great.

The infant should wear loose woolen garments next to the skin, and especially over the abdomen. Otherwise there is a danger of too rapid cooling of the skin, a vasomotor contraction of the capillaries, a rush of blood to the distended cells of the lining of the intestines, resulting in an increased secretion of mucus, and a consequent diarrhœa.

The infant needs very little food on warm days when the humidity is great. He is having all he can do to excrete the heat generated by the processes of living, and will be overburdened if he is called on to eliminate the additional heat liberated as a result of the digestion of food, which is considerable. Under such depressing conditions there will be a retardation of the digestive process, and the undigested food will probably commence to decompose and a poisoning process be set up.

Plenty of cool boiled water to drink must be given, so as to replace water lost as perspiration. When the humidity is very high the food should be diluted to one-half with boiled water.

The infant should be bathed twice daily to remove fat and salts left by evaporation of the perspiration.

On warm, humid nights milk feedings should be omitted, because the humidity is greater at night than during the day, and gruels and whey, which produce little heat, should be given.

Circulation of air must be provided, as stagnant air soon becomes saturated with water vapor, and no more perspiration can evaporate and absorb heat. *G. E.*

On the Influence of Rest, Exercise and Sleep on Gastric Digestion. (*Julius Friedenwald, Baltimore, Md., American Medicine, August,* 1906.) A review of the opinions expressed, and of the observations made, by various authors from Hippocrates to Beaumont (1847), and later still to Schule (1895), revealed conclusions so conflicting that the subject seemed to require further investigation.

Two individuals with normal digestion, and eight suffering with various gastric disturbances, were subjected to the following experiments:

They were given a test dinner consisting of 40 c.c. of soup, 200 gm. of beefsteak, 50 gm. of wheat bread, and 200 c.c. of water; the tests were removed after four hours. The stomach was as completely emptied as possible, and then washed with a definite quantity of water, and in this way the total amount of contents remaining in the stomach four hours after a test-dinner could easily be ascertained, from which a fairly clear conception of the motor activity could be obtained. The gastric content was then examined for the total acidity and the percentage of free acid. The individuals were examined (1) after resting, (2) after moderate exercise, that is after walking about leisurely, (3) after excessive exercise during a greater part of the time, and finally (4) after sleeping. In order to ensure sound sleep five grains of trional was added to the test meal in the special experiments; only, however, after ascertaining that this drug had no appreciable effect either on the motor or secretory functions of the stomach. Eight observations were made on each individual.

1. In two *normal* cases, the results were practically identical, and demonstrated that under normal conditions: (*a*) during rest, or (*b*) during moderate exercise, neither the secretory nor the motor function of the stomach is in any way affected. (*c*) After violent exercise or (*d*) during sleep after a meal, however, the secretory function remains normal, but the motor function is slightly disturbed.

2. In two cases of hyperchlorhydria with normal motility, it was shown that: (*a*) While resting, the acidity is reduced, the motor function remaining normal. (*b*) During moderate exercise, the acidity remains unaltered, the motor function being normal. (*c*) During excessive exercise and (*d*) during sleep, the acidity is about the same, and the motor function is markedly impaired.

3. Two cases of hyperchlorhy-

dria with motor insufficiency showed that: (*a*) During rest, the acidity is lessened and the motor function is impaired. (*b*) During moderate exercise, the acidity and motor function remain unaltered. (*c*) During excessive exercise, the acidity remains unchanged, while the motor function is still further impaired. (*d*) During sleep, the acidity is still further increased and the motor function is still further impaired.

4. Two cases of catarrh with normal motility demonstrated that: (*a*) During rest, the acidity is increased, and the motor function remains normal. (*b*) During moderate exercise, the acidity remains unaltered, and the motor function remains normal. (*c*) During excessive exercise, the acidity remains unchanged, while the motor function is markedly impaired. (*d*) During sleep, the acidity is still further increased, and the motor function is again markedly impaired.

5. Two cases of catarrh with motor insufficiency showed that: (*a*) During rest, the acidity seems to be increased and the motor function impaired. (*b*) During moderate exercise, the acidity and the motor function remain unchanged. (*c*) During excessive exercise, the acidity remains unchanged, while the motor function is markedly impaired. (*d*) During sleep, the acidity remains unchanged, while the motor function is further impaired.

From these observations, the author drew the following conclusions:

1. In persons with normal digestive powers it makes little difference whether the individuals rest, exercise, or sleep after meals; though after violent exercise or sleep the gastric digestion is very slightly impaired.

2. In patients suffering with superacidity and subacidity it is best to order rest after meals; after violent exercise or during sleep, the digestion is impaired in these cases.

3. In patients suffering with motor disturbances of the stomach, it is best to prescribe moderate exercise after meals, for rest, violent exercise, or sleep disturbs the digestion under these conditions.

G. E.

The Treatment of Emaciation. (*L. Breisacher, Detroit, Michigan, Journal of the American Medical Association, August* 25, 1906.) Most writers recommend that their patients, who wish to be treated for leanness or emaciation, be liberally fed, but have ignored the causes and the accompanying conditions of this difficulty.

Leanness may be of an apparently hereditary character, or it may be acquired and arise as a primary or secondary condition.

The one great cause of leanness, excluding diseases like tuberculosis, diabetes, nephritis, and cancer and conditions like stenosis and vomiting, is the ingestion of an insufficient amount of food. This may result from a primary or secondary loss of appetite, or a repugnance to food in consequence of various disorders, or as the result of emotions like pain, grief, sorrow, etc. It may sometimes be the result of a faulty dietetic habit handed down through several generations. Frequently it results from ignorance of the nutritive significance of particular foods, or is the effect of eating but one or two meals a day, by persons not constitutionally fitted for that sort of regime. It may be the result of poverty, or the attempt to economize. It may be due to sexual neurasthenia, hysteria and nervousness, especially in persons of a typically nervous temperament. Recently it has been attributed by Cabot, to arteriosclerosis and sleeplessness.

To the second group of causes belong the gastro-intestinal disorders, which may be either of mechanical, chemical or secretory origin. The foundation of this class of cases, with the frequently resulting emaciation, is often laid at the time of the birth of the child when it is artificially, instead of naturally, fed.

As further causative agents should be mentioned the improper metabolism of food, and the increased oxidation of food after it has become an integral part of the blood.

In treating this condition it is necessary to examine the patient thoroughly, and to determine accurately the state and degree of digestive activity, and also to what degree the stomach and bowels will bear forced feeding, and what foods these organs will most readily digest and absorb.

Having determined all the etiological and physiological factors, I map out a diet list which will contain from 2200 to 2500 calories, and gradually increase the amount until I reach a diet containing from 3800 to 4500 calories.

I strive to give from 100 to 250 gm. of fat in the form of milk, cream, butter, olive oil or emulsion. To this I add albumin-containing food to amount to 150 gm. and carbohydrates amounting to 400 gm.

The entire caloric worth is shown in the following table:

Fat	250x9.3 = 2,325
Albumen	150x4.1 = 615
Carbohydrates	400x4.1 = 1.640
	4,580

Tonics, both vegetable and mineral, and nerve sedatives, but not narcotics, should be used as occasion demands.

The excretory activity of the kidneys should be estimated from time to time, and compared with the entire water intake, which should be from 2000 to 3000 c.c.

The exercise should be lessened or increased as the case may require, and frequent tepid baths, cold rubs, massage and electricity may be resorted to with advantage.

On a regime of this kind, convalescents often gain weight so rapidly that it becomes necessary to reduce the diet.

The chronically underfed usually require from two to six months of very careful manipulation, with the continuous coaxing of the digestive tract, and the constant tempting of the palate to achieve the desired result.

G. E.

MECHANOTHERAPY

Air Dilatation in the Treatment of Chronic Constipation. (*Louis J. Hirschman, Medical Record, August* 11, 1906.) Hirschman looks upon chronic constipation as the most common of all diseased conditions, and many persons who carefully observe proper dietary and hygienic rules are thus afflicted. It is unwise to use drugs in such cases, but excitement of the defecatory function by distension of the gut whereby physiological peristalsis is stimulated, is a most satisfactory procedure and he has devised the following-described apparatus for the attainment of this object.

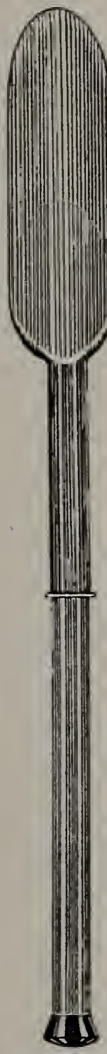


Fig. 1.

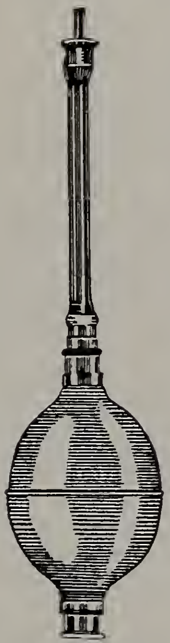


Fig. 2.

" It consists of a rubber bag with a stem, which is slipped over the distal end of a Wales bougie (No. 3-5), the Wales bougie being canaled (Fig. 1). Compressed air at a low pressure is slowly allowed to enter the bag, and distention to any desired extent is produced. By means of a cut-off valve this distention can be easily regulated. Where the compressed air apparatus is not convenient, an ordinary atomizer bulb (Fig. 2) or a small bicycle pump may be utilized.

" The patient is placed in the Sims position. The bag is lubricated and deflated, is passed upward into the rectum, and through the rectum into the sigmoid to any desired height, the Wales bougie being firm enough to carry the bag up into the sigmoid, and yet, being flexible, does not create any discomfort or do any injury in its passage; and it obviates the use of the proctoscope in its introduction. When the bag is in position it is slowly inflated until the patient complains of a sense of either fullness or pain, or a desire to move the bowels. The air is allowed to escape, and after an interval of a few seconds it is again inflated to the point of tolerance. This alternate inflation and deflation is repeated about four times to the minute for a period of five minutes or so; then the bag is inflated again to the point of tolerance; the cut-off valve is disengaged and the opening in the bougie is closed with the thumb, and then, by a to-and-fro motion, the apparatus is gently and slowly withdrawn. This massages the bowel as it is withdrawn, and also gently dilates the sphincter.

" This treatment is repeated daily for from five days to a week, and usually after the first or second treatment the patient will have a small unaided movement. Cathartics and enemata are, of course, strictly enjoined. Each day the patient will report a slightly larger and more satisfactory defecation. When the defecation approaches the normal, treatments are given only on alternate days. After three or four days, the interval is lengthened to two days, and then to three; and then to four; then the patient is asked to report again in five or six days. If he reports satisfactory evacuations daily he is allowed to go a week, and then, if a similar report is made, he is discharged as cured, but asked to return on the first day on which he does not have a normal stool.

" If the case is properly diagnosed and instructions as to a regular time for daily evacuations and strict obedience to nature's calls are carried out by the patient, as well as the proper dietary being lived up to, the results from this method of treatment will be very gratifying."

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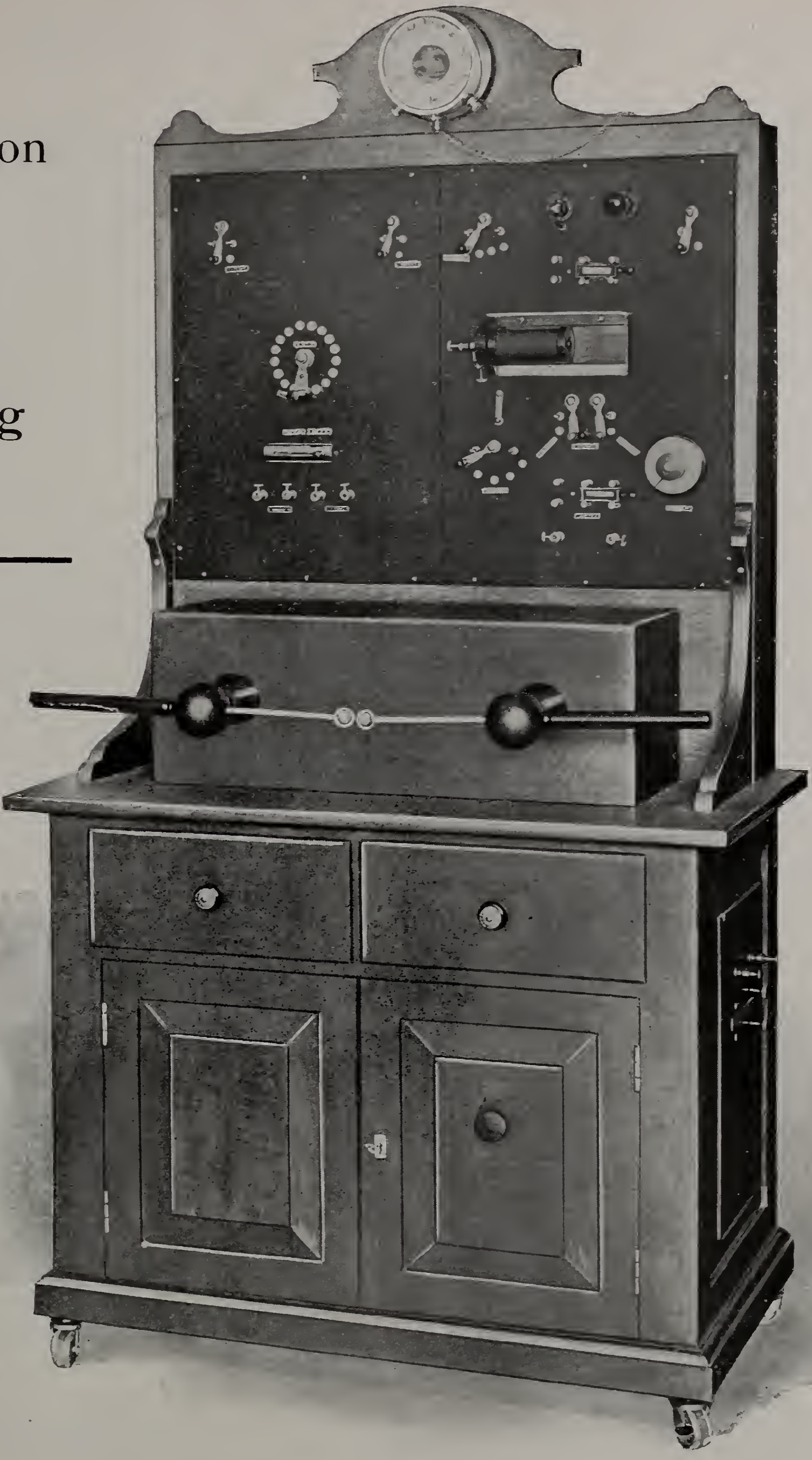

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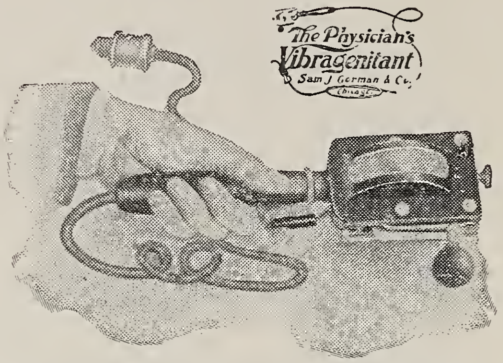

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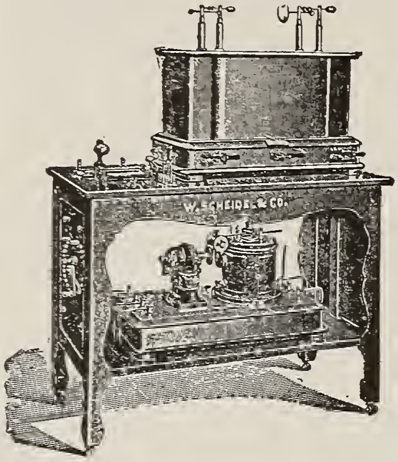
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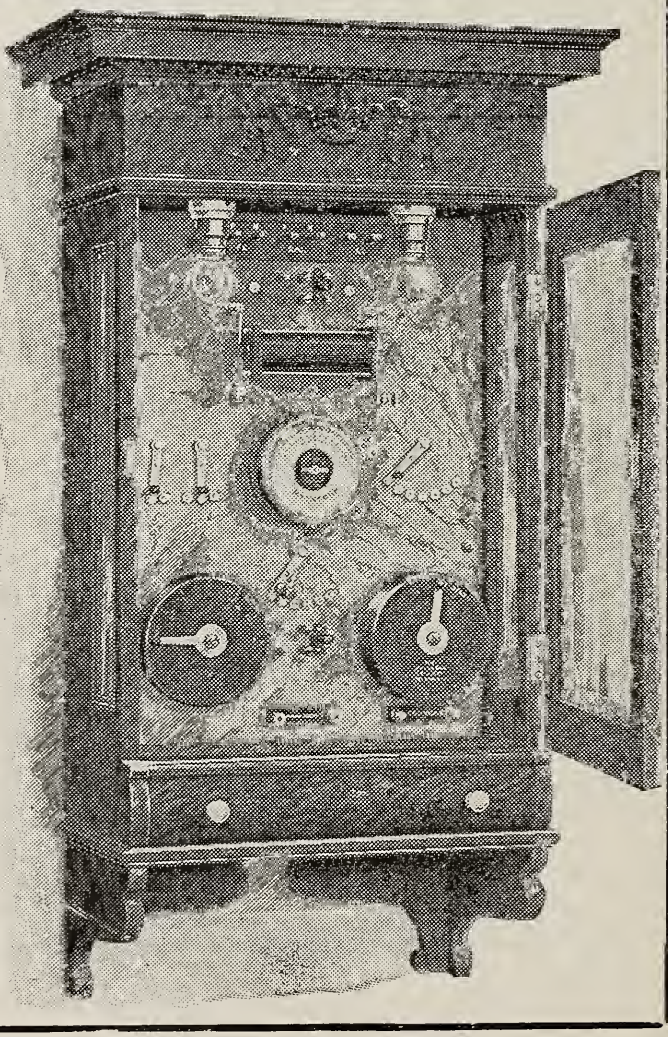

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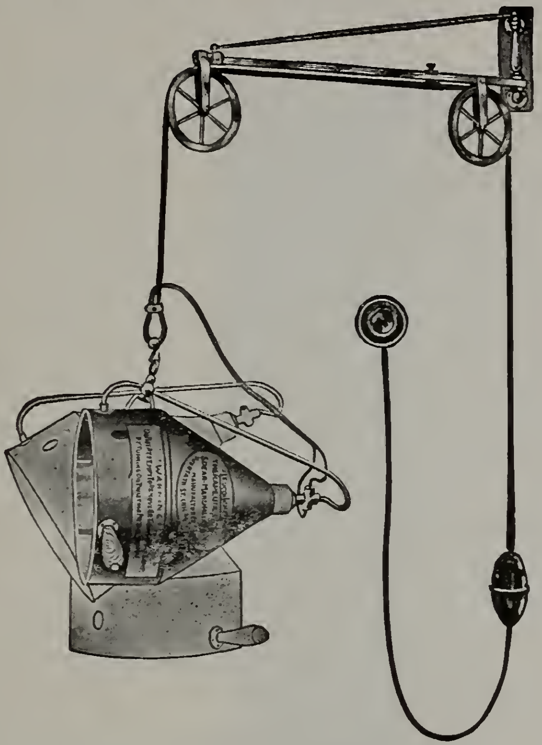

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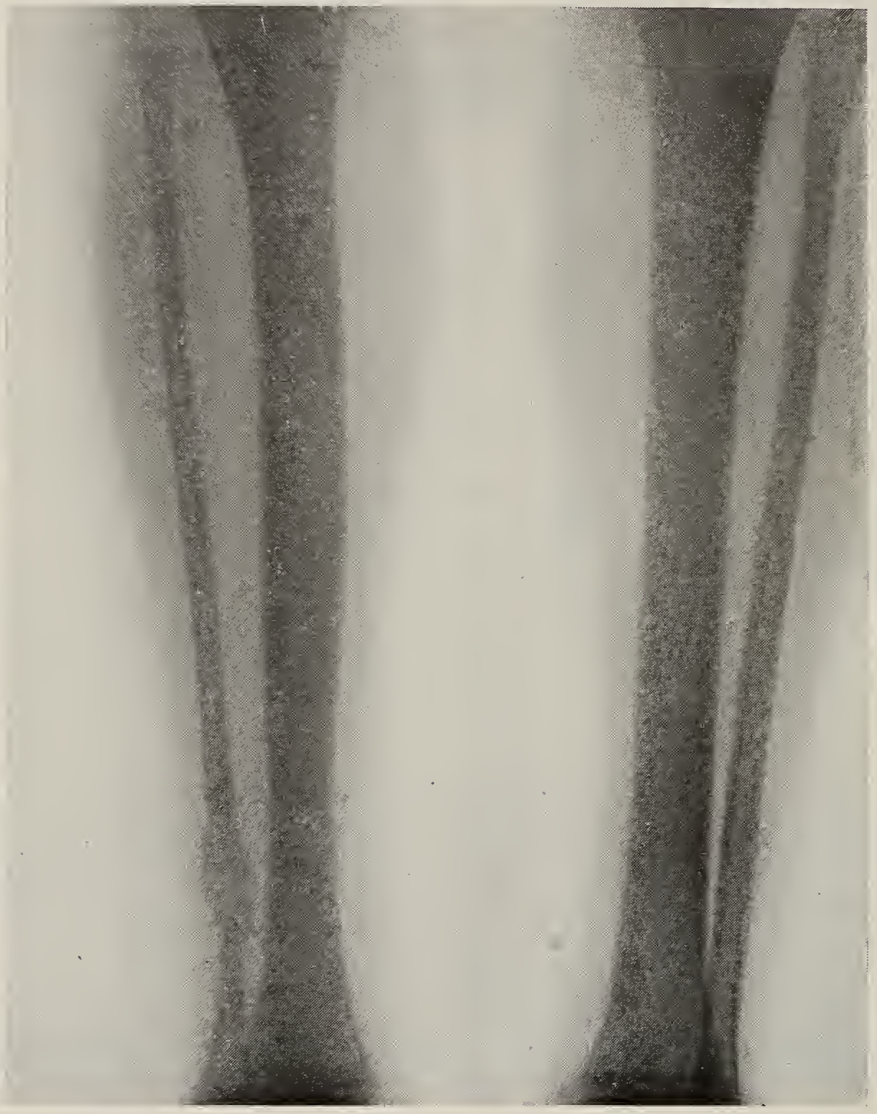

SPECIAL PLATE LXIX

OSTEOSARCOMA OF FIBULA

Patient was a child ten years of age, and the lesion had been diagnosticated, before the roentgenograph was taken, as tuberculosis, fracture, osteomyelitis, and syphilis. The Roentgen diagnosis was confirmed by subsequent operation. Note nutritional loss in structure as compared with normal condition of the opposite leg.

Made with a Griffith-Soiland coil with Wehnelt interrupter, Friedlander tube with anode eighteen inches from the plate, thirty seconds exposure, ten amperes in primary circuit.

By Dr. Albert Soiland, of Los Angeles, California.

THE ARCHIVES OF
PHYSIOLOGICAL THERAPY

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Volume IV DECEMBER, 1906 Number VI

RADIOGRAPHIC MEASUREMENT OF THE DIAMETERS OF THE FEMALE PELVIS AND NEW TECHNIQUE IN RADIOGRAPHING VESICAL CALCULI*

BY GEORGE E. PFAHLER, M. D., OF PHILADELPHIA, PENNSYLVANIA

PROBABLY the most critical period in the life of a woman is that of the birth of her first child. Two lives are at stake at this time. Much of the uncertainty could be eliminated if the attending physician could determine accurately the diameters of the pelvis of the mother, and if with this he could know the exact size of the child's head, the case could be dealt with in the most skillful manner.

If the diameters were found to be contracted, premature labor could be induced, or all provisions could be made to assist in the labor before the woman became exhausted; or a Cæsarean section could be performed, and in this way the lives of both the mother and the child could be saved.

Obstetricians have done much toward accomplishing this result by taking external measurements of the pelvis, and by measuring approximately the internal diameters. Accuracy has, however, not been obtained though very much desired.

It is this long-felt want that prompted one of our obstetricians, Dr. W. Frank Haehnlen, to suggest to me the use of the Roentgen rays for this purpose. Scattered attempts have been made to measure the diameters of the female pelvis by means of the Roentgen rays, but in general the methods used have not been found practical. Even the method that I shall describe, though it seems very simple, may not be found practical.

On account of the mass of tissue to be penetrated in a pregnant woman, it will be found difficult by any method, and it is likely that only those who have perfected their technique and are able to make short exposures will feel justified in attempting this work. Stereoscopic radiographs might be made, but this will necessitate two exposures, and in the light of recent experiments (which I believe to be exaggerated in importance), it is important to make a single exposure and that as short as possible.

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*Read at the Seventh Annual Meeting of the American Roentgen Ray Society, at Niagara Falls, N. Y., August 29-31, 1906.

It was as a result of the suggestion of Professor Haehnlen that I have developed the following technique and apparatus for the purpose of measuring the diameters of the female pelvis.

This, as well as any other technique which has for its end result *accuracy*, must have accuracy as far as possible in every little detail. Unless each measurement is taken accurately, the end result will be inaccurate and will be of more annoyance to the physician than assistance.

The principles upon which this technique is based are as follows:

1. The plate must be placed parallel with the brim of the true pelvis.
2. The distance of this pelvic brim must be measured as accurately as possible and recorded.
3. The anode of the tube must be placed in the axis of the plane of the brim of the pelvis.
4. The exact distance of the anode from the plate must be accurately measured and recorded.

If these four principles are accurately followed the diameters of the pelvis will be accurately determined. Any error in the observance of these four principles will necessarily give an error in the end result. Therefore our whole attention must be occupied in providing means to observe these four principles.

1. For the purpose of placing the plate parallel with the brim of the pelvis I have constructed a bracket (Fig. 1), which consists of a base-board 10 x 24 inches. At a distance of 9 inches from one end is placed a second board 10 x 11 inches, at an angle of thirty degrees. This is supported by a triangular piece of wood. This bracket is placed upon any radiographic table. The patient is placed upon this base-board with the buttocks and coccyx resting upon the bracket.

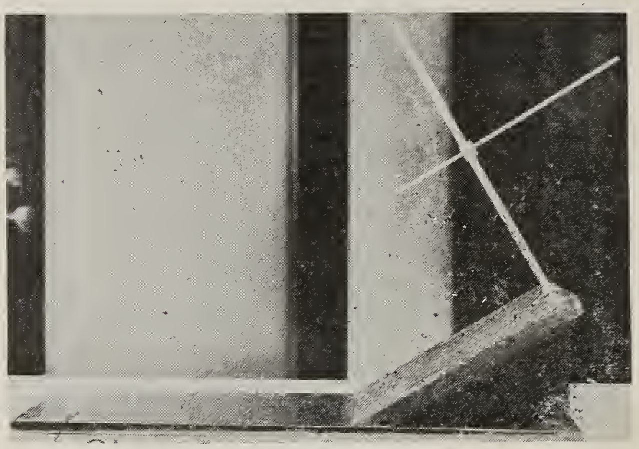

FIGURE I

This bracket will then correspond to the plane of the brim of the average normal pelvis. By means of a mattress, the body is raised about three inches, so as to bring the entire shadow of the brim of the pelvis upon the plate. Patients prefer to lie upon a mattress, and since it in no way interferes with the accuracy it is an advantage rather than an objection. The plate is then placed upon this bracket beneath the pelvis. The thighs are flexed upon the abdomen and rotated outward. They may be supported by means of a bandage extending from the hook at the end of the base-board.

2. We must now determine the distance of the brim from the plate or from the anodes of the tube. By palpation the crest of the pubis can be felt, and the thickness of the fat estimated as accurately as possible, and subtracted from the total distance of the pubis from the plate or added to the distance of the anodes from the skin. The estimation of the thickness of the fat will give practically the only

chance for error in the end result. A man should, however, be able to estimate the amount of fat to within an eighth of an inch.

3. The third step is to place the anode of the tube in the axis of the brim of the pelvis. To facilitate this I have placed a rod at right angles to the board holding the plate, and attached it to the middle of the top edge (Fig. 1). The median line of the body should pass through this rod. This rod is now parallel to the axis of the brim of the pelvis. We now measure the distance from this rod to the inside of the pelvic brim, which can be felt at the symphysis pubis. To this distance is added two inches (half of the normal antero-posterior diameter). A second movable rod (Fig. 1), attached at right angles to the first rod, will facilitate the making of these measurements (I am indebted to one of my students, Dr. Gaylord, who is a skilful mechanic, for the construction of these rods). The anode is easily placed in a line with the point obtained by these measurements, and this is done in less time than it takes to describe it.

4. The fourth step is to measure the distance of the anode from the plate. This, of course, is very simple. The anode can be placed at any distance. The greater the distance the greater will be the accuracy, but the difficulty of getting a good radiograph will also be greater. I have found twenty inches most convenient.

Having recorded these factors and obtained a good radiograph, the determination of the diameters of the pelvis is a mere matter of calculation.

The diameters as measured in the radiograph represent the degree of divergence of the rays at the distance of the plate from the anode (twenty inches). The question then is, "What is the degree of divergence of the rays at the distance of the pelvic brim from the anode?" We obtain the distance of the anode from the symphysis by direct measurement, or subtract the distance of the symphysis from the total distance of the anode from the plate.

Reducing this to a formula, let "A" represent the total distance of the anode from the plate; "B" the diameter as measured in the radiograph; "C" the distance of the symphysis from the anode; and "X" the diameter of the true pelvis. Then the formula would stand:

$$A : B :: C : X$$ (Fig. 2).

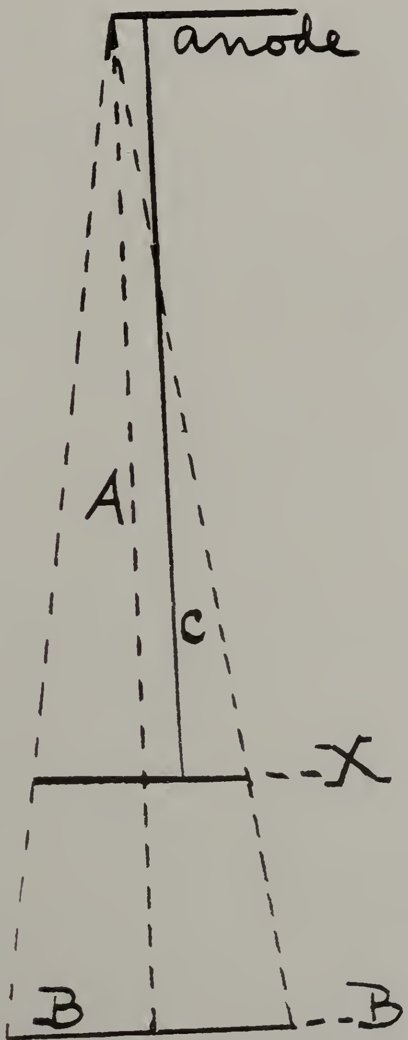

FIGURE II

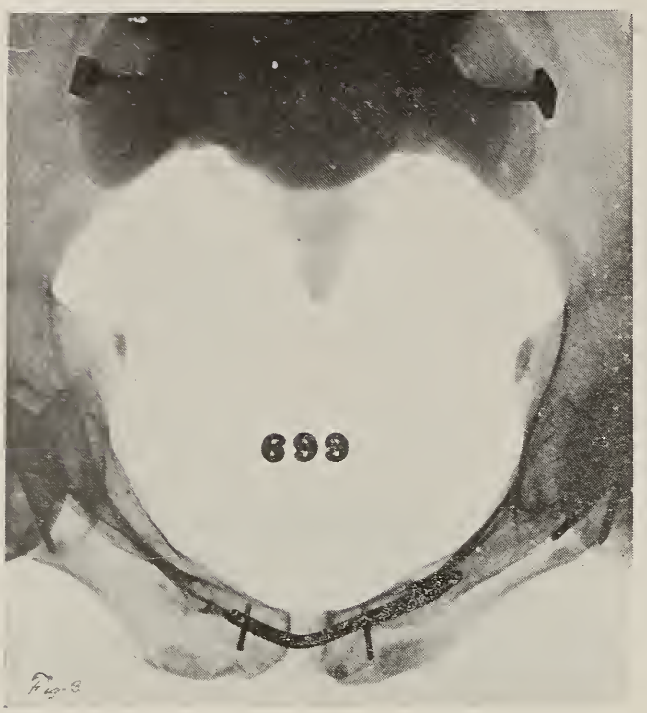

FIGURE III

Take as a concrete example Figure 3, which is a radiograph of a normal skeleton pelvis. The distance of the anode from the plate was twenty inches; the antero-posterior diameter as measured in the radiograph is five and one-eighth inches; the distance of the anode from the symphysis was sixteen and three-quarters inches; therefore the antero-posterior diameter of the true pelvis must be 4.29 inches, and this is the correct measurement of the pelvis used.

Take as a second concrete example Figure 4, which is the radiograph of a normal pelvis in a living woman (non-pregnant). We have a right to assume that a woman who has given birth to a normal child, normally, has a normal pelvis, the woman being normal in all outward appearances.

The distance of the anode from the plate in this instance was twenty inches; the antero-posterior diameter as measured in the radiograph is five and one-half inches; the distance of the anode from the symphysis pubis was fourteen and one-half inches; therefore the antero-posterior diameter of the true pelvis at the brim is 3.9875 inches. Four inches is given as the normal antero-posterior diameter, therefore this must be considered normal.

This may seem like a complicated method, but it is not and the only real difficulties will be in obtaining a good radiograph in a pregnant woman, and in determining accurately the distance of the symphysis pubis from the anode of the tube.

We should be careful to place the brim of the pelvis parallel to the plate. This can be done by determining that the anterior superior spines are the same distance from the plate. If the patient is allowed to twist her body, the pelvic shadow will, of course, be distorted.

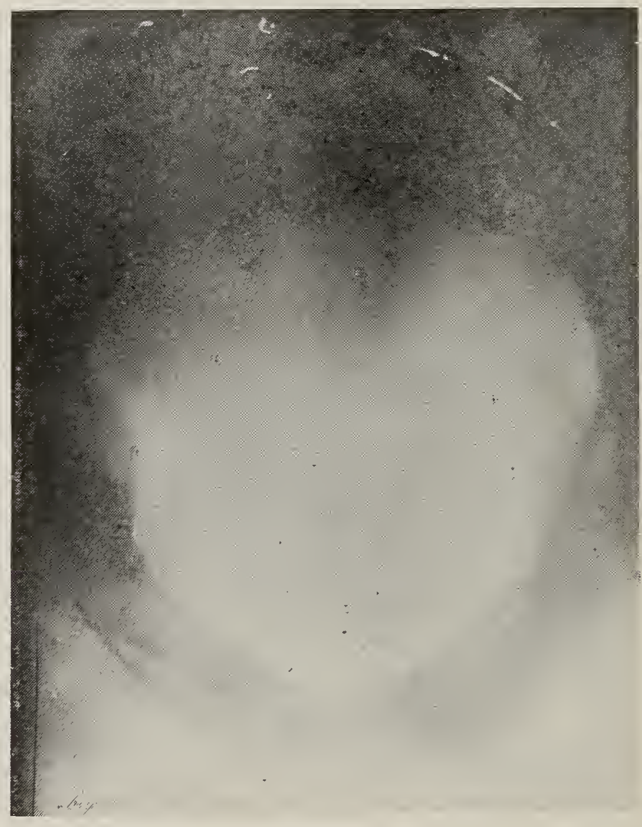

FIGURE IV

This method has the advantages of simplicity and accuracy, with only one exposure.

I began this work only a short time before going away on my vacation. This, with the fact that our maternity wards are practically closed during the summer months, has prevented me from making practical application of the method in pregnant women, and in this way working out some of the practical problems that I feel will present themselves.

New Technique in Radiographing Vesical Calculi

One of the disadvantages of the present method of radiographing vesical calculi is that the shadow must be projected a considerable distance before reaching the plate. This decreases the intensity of the shadow and at times makes it almost or quite impossible to recognize. Another disadvantage is the possibility of having the shadow of the vesical calculi obscured by the shadow of the pubic arch as it is projected forward.

By making use of the "pelvic bracket" and the technique described for measuring the diameters of the pelvis (omitting the measurements), we bring the plate nearer to the calculus, and thus increase the intensity of the shadow and the certainty of the diagnosis.

It has not been my privilege to examine a case of vesical calculus since I have adopted this technique. I therefore have no illustration to offer to you. It surely offers some advantages, however, and I see no disadvantages.

I offer whatever apology is due the society for presenting these subjects incompleted, but lack of time and opportunity to date have prevented my completing these investigations. I present these subjects at this time before this body of expert radiologists because they are purely technical subjects, and for the purpose of receiving criticisms and suggestions that will assist me in further investigations, and with the hope that they may be made use of by others.

A NEW DIRECT-READING X-RAY METER*

BY GEORGE COFFIN JOHNSTON, M. D., OF PITTSBURG, PENNSYLVANIA

Secretary of the American Roentgen Ray Society; Radiographer to St. Johns Hospital, Allegheny, Pa.; Children's Hospital, Pittsburg, Pa.; Professor of Radiotherapy at the Western Pennsylvania Medical College, etc.

EVER since Roentgen discovered the existence of the invisible form of wave length, since known by his name, efforts have been made to devise a means whereby a measurement could be obtained of the quality and quantity of rays emitted from the excited Crookes tube. With these attempts at measurement, this Society is familiar, but I shall enumerate briefly the virtues and defects of each.

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*Read at the Seventh Annual Meeting of the American Roentgen Ray Society, at Niagara Falls, N. Y., August 30th, 1906.

Holzknecht's Chromoradiometer

This consists of a quantity of potash salts mixed with copal varnish inclosed in a celluloid capsule. As furnished to the operator this capsule is about the color of the varnish, a dirty yellow, but under the influence of the rays, it changes in color, finally becoming green. There is furnished with the capsules a scale of shades of green, divided into eleven spaces. The reagent having been exposed to the ray, is moved along the scale until a point is found where its tint matches a tint upon the scale. Thus, if tint 4 of the scale matches the tint of the capsule, the surface upon which the capsule was placed during the exposure is said to have received four units, H.

Holzknecht claims that by the use of this reagent an exact dose may be given and that precisely the degree of reaction prescribed and pre-determined will follow. It seems, however, that this method is not free from error, and I possess a dim recollection of one case wherein the result was so disastrous as to eventuate in the assessment of punitive damages at the hands of an unappreciative court. These capsules, having once been used, regain their color upon exposure to light, but must never be used again.

This method takes no account of idiosyncrasy, in fact, it ignores it, whereas every operator of experience knows that frequently an individual is met with, possessing such peculiar susceptibility to the undesirable effects of the ray as to render him an object of concern to the peace of mind of the roentgenologist.

The unit H. is defined as that quantity of X-rays exactly capable of producing a certain reaction upon living tissues. Such a unit is inexact and unscientific and should be replaced by one founded upon definite chemical action as evidenced by the amount of a known salt (in solution or otherwise) decomposed by exposure to the ray, all other decomposing factors being carefully eliminated, or better by a C. G. S. unit founded upon the equivalent heat value of the ray when so transformed.

Freund's method consists in estimating the amount of free iodine liberated by the ray when a solution of iodoform in chloroform is exposed to the ray. This re-agent, being sensitive to light, must be employed in non-actinic containers and the amount of iodoform liberated determined by means of quantitative analysis. This is a very exact method of telling what you have done, after you have done it.

Sabouraud makes use of the platino-cyanide of barium, made into little wafers pasted on paper. The cyanide, upon exposure to the ray, changes from apple green through red, brown and maroon. With these pastilles is furnished one which has been exposed to a certain quantity of radiation corresponding to the maximum dose of X-ray which it is safe to apply to a healthy skin of a normal patient, and which is just enough to produce a temporary epilation, but not enough to give rise to a dermatitis. This device is particularly intended for use in the treatment of sycosis and other diseases where a quick, painless epilation is desired. The pastille must be placed not on the patient's skin, but at a distance of eight centimeters from the anti-cathode. In some tubes, however, this would necessitate placing the pastille on the surface of the tube, or even inside the tube, and with some tubes, the pastille is so close that it is acted upon by radiant heat from the tube, which will promptly produce the same change of color as the X-ray. These pastilles must never be used for the second exposure, although they do regain their color when placed in the light and where they may absorb moisture.

Kohler attempted to measure X-rays by means of a thermometer in the wall of the tube. This method does not need discussion in order to condemn it, as no one has ever proved any relation between the heat and the X-rays emitted from any given tube.

Kienbock places on the surface under treatment a piece of photographer's paper inclosed in a non-actinic envelope. After the patient has been treated, or at any time during the treatment, the jacket is removed, the slip of paper is developed and compared with the color scale. This method is accurate if the same sensitometer test paper is always used, if it be developed immediately following the exposure in the same developer, at the same temperature, for the same length of time, washed and hypoed for the same length of time, and always examined either dry or wet. But it introduces a personal equation in that the developed slip must be compared with a graduated scale of tints, thereby permitting of the possibility of great error.

Guilleminot compares the illumination of a fluorescent screen under the action of a sample of radium of known strength with that of a screen exposed to the influence of an X-ray tube, and measures the square of the distance of the screen from the tube necessary to produce equal illumination. Any one who has tried to compare the fluorescence of two screens under different illumination or who has ever made any photometric readings will appreciate the possibility for gross error in this proceeding.

Bordier uses platino-cyanide of barium made into a pastille, the back of which is adhesive and is to be attached to the skin over the part under treatment. There is supplied with these pastilles a color scale having four tints; number one a dull yellowish green. This is exactly the shade that the pastille will take when it has been exposed to the maximum dose of X-rays compatible with the complete integrity of the normal skin. With this dose, the hair falls out twenty days after the exposure, but grows again in another twenty days, and no reaction is present unless a very low tube is used. Other shades correspond to increasing doses of the ray.

The milliamperemeter when placed in series with the X-ray tube is of great value when in the hands of an expert employing it with a tube with the working of which experience has made him thoroughly familiar. But it is necessarily an exact measurement of the current flowing in the tube circuit and nothing more. And where one or a series of valve tubes is employed in the circuit, it is not even a measurement of the internal resistance of the tube. I have one tube which gives a beautiful fluorescence and backs up a spark-gap of two inches. Yet when taking a current of two and one-half milliamperes, it gives off no X-rays whatever; at least none that can be detected by means of a fluoroscope. With a normal tube, however, and a coil that is free from inverse discharge, it is a very valuable instrument especially when making quick exposures with heavy currents in radiography.

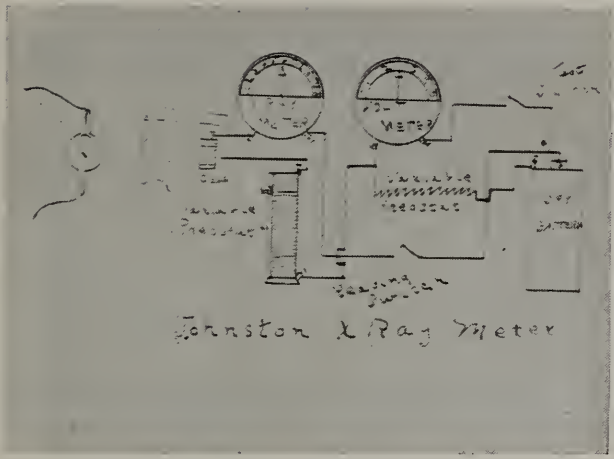
The meter which I have devised resembles these described in no respect. In my device a direct reading is given by a pointer moving over a graduated scale, the movement of the pointer being in direct relation with the quantity of one quality of radiation, and that the most important emitted from the tube. What I measure is the quantity of rays which have the power of rendering fluorescent certain salts, such as barium platinocyanide, tungstate of calcium and others. These rays are the so-called X-rays, and while there are undoubtedly many other forms of radiation emitted from an X-ray tube when in action, yet it is sufficient for the purpose that we be able to measure accurately, continuously and safely, the X-rays alone. This is accomplished by means of the following device:

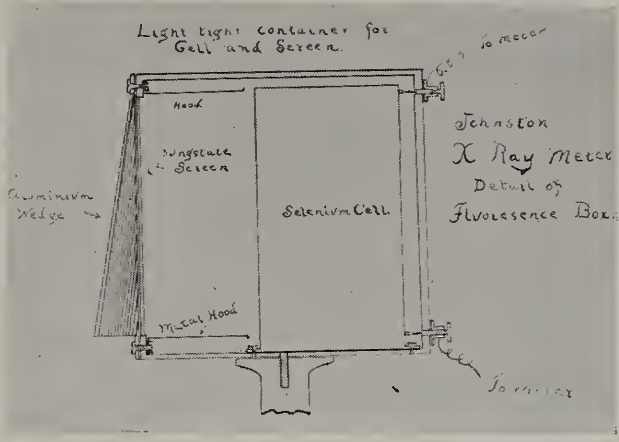
It is well known that when the X-ray strikes upon particles of certain salts, tungstate of calcium for example, these salts, if observed in darkness, may be seen to become brilliantly luminous or fluorescent, and this fluorescence bears a constant ratio to the intensity of the rays and to the distance from the point of emission of the ray as they, in common with all forms of wave length emitted from a point, fall off as the square of the distance.

Now it has been customary among X-ray workers since the discovery, to judge of the amount and the quality of the X-ray emitted from any tube when in action, by observing this power of the ray to induce fluorescence by means of a screen coated with crystals of tungstate of calcium or other salt and made a part of a light-tight box, having an aperture for the eyes of the observer, such contrivance bearing the name of a fluoroscope

Estimations of the power of penetration of the ray were made by holding behind the screen in the path of the rays, various objects (usually the hand of the observer), and this practice was responsible for serious injuries, loss of fingers, hands and lives, since the repeated exposure of the operator's person to the ray resulted, sooner or later, in peculiar ulcerations, miscalled X-ray burns, but in spite of this danger this method is persistently followed at present because experience has shown that it is the best way of actually determining the quality and quantity of invisible radiations emitted from the tube. In place of the observer's hand, various other objects possessing a variation in the degree of opacity to X-ray have been substituted and are used for such observation, but the readings are inaccurate; they require, since they are made in the dark, that the observer's eye should be accustomed to the darkness, hence their accuracy depends upon the condition of the observer's eyes at the time the reading is made, and no two observers will read the same degree of penetration.

In my invention the fluorescence induced or produced upon a tungstate of calcium or other screen is employed as indicating the quantity of the X-rays emitted. The fluorescent screen is placed in a light-tight box or container. Facing the fluorescent screen is placed a selenium cell, which cell, as is well known, has the property of changing its ohmic resistance to the passage of electrical currents with relation to the presence or absence of light waves. Such a cell when kept in total darkness





protected from light of all kinds, may have a resistance of several hundred ohms, yet upon permitting light, natural or artificial, to strike upon the cell, its ohmic resistance falls almost instantly to a great degree and the variation in ohmic resistance thus produced bears a direct relation to the intensity of the light.

If, therefore, there be placed in series with such a cell as described, a galvanometer or ammeter of sufficient delicacy, a source of electrical current such as an ordinary so-called dry battery, a variable rheostat providing a means of introducing more or less ohmic resistance into the circuit, and the rheostat, the measuring instrument, and the selenium cell be balanced, a point will be found at which the ohmic resistance of the rheostat, the connecting wires, the selenium cell and the measuring instrument will exactly balance the electro-motive force of the battery cell and, no current passing, the measuring instrument (galvanometer or milliamperemeter) will stand at zero.

If now, however, the container having within it the screen and the selenium cell be placed in the path of the X-ray proceeding from an excited X-ray tube, the screen will become luminous in proportion to its distance from the source of the rays and the quantity of rays striking it, the container will be illuminated, the selenium cell under the influence of this light will change its ohmic resistance, in proportion to the light, a current will flow proportionate to the change in ohmic resistance of the selenium cell, and the current flow will be measured and indicated on the dial of the galvanometer or other instrument employed for the purpose of making this electrical measurement, and the reading of this instrument will increase or diminish directly as the variation in intensity of the fluorescence upon the screen, which fluorescence is dependent upon the activity of the X-ray tube in emitting those rays which have the power of inducing such fluorescence upon the screen so constructed. It is evident, therefore, that such an instrument will give a direct reading without calculation and a continuous reading of the rays emitted.

It is necessary, however, that the current employed should be the same for each reading, and I have provided therefore a means whereby the voltage of the battery cell may be taken at any time in order to guard against error from this source.

I spent the greater part of three years in endeavoring to devise a meter which any one could read, which required no calculations, not as much as it does to tell time by a clock. One, moreover, which would enable operators in different localities, using utterly different apparatus, to estimate the actual output of every outfit in X-rays, and thus to be able to compare results and methods. Such a meter I believe I have at last devised. It is far from perfect and, like everything else, is open to improvement, but it is the first thing that I have ever been aware of that actually indicated the output of a Crookes tube in X-rays. I believe the fundamental ideas underlying it are not only new and novel, but accurate, and I hope to be able to place in the hands of the scientific X-ray worker within a short time, a carefully standardized meter, which will be recognized as standard and which will give at all times a true and accurate reading of the value of a tube as a transformer with relation to the quantity of electrical energy, transformed into X-rays. This meter has nothing to do with the current flowing in the tube circuit. It concerns itself not at all with the make of tube, coil or interrupter. It is not affected in its readings by anything or influence, except the quality and quantity of the X-rays which strike upon the fluorescent screen. It will necessarily be expensive since the selenium cells themselves cost $30.00 each. But the apparatus must be manufactured with accuracy as the first requirement, and cost of production should not be allowed to interfere with proper construction.

NOTE RELATIVE TO THE ESTIMATION OF ROENTGEN DOSAGE *

BY HENRY G. PIFFARD, M.D., OF NEW YORK CITY

I USE the term estimation in preference to measurement as there does not exist at the present time, so far as known to me, any method by means of which the quantity of X-rays delivered and their biological effects can be directly measured.

Numerous methods, however, are at command whereby certain physical and chemical phenomena may be measured and their effects on the tissues estimated with more or less accuracy. The most thorough discussion of the various methods already proposed, that I know of, will be found in articles by Bordier (of Lyons); H. Lewis Jones (London); Kienbock (Vienna); Hall-Edwards (Birmingham) and Reus (Chemoga), contained in the June issue of the *Archives of the Roentgen Ray.*

Holzknecht's method is the one that certainly has been exploited the most, but it is now very generally discredited. Sabouraud and Noire used little pastilles of platino-cyanide of barium which under the influence of the rays change from green to yellow and finally to orange; and from all accounts this device gives perfect satisfaction in the city of its birth. One objection to it, however, is the fact that to use it effectively necessitates a small tube whose diameter does not exceed four inches. Bordier also employs the platino-cyanide as an indicator, but has greatly improved on the Sabouraud device, in so much as, with his pastilles, a tube of any size may be used, and he has a comparative color scale of five tints, ranging from a faint trace of yellow to deep orange.

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* Read at the Seventh Annual Meeting of the American Roentgen Ray Society, at Niagara Falls, N. Y., September, 1906.

The change in the color of the platino-cyanide is due to dehydration of the salt under the influence of the rays, and without doubt works well when the atmospheric humidity is low. A warning, however, comes from London, as the damp atmosphere of that city so hinders the color change that a dangerous over-exposure is liable to occur if the test color is relied on. My personal experience last summer tends to confirm these findings. This summer the Bordier pastilles reached me about the middle of July and I immediately made a test with an exposure that certainly would have resulted in a severe burn of the third degree, and yet the color change would simply indicate a mild erythema. A similar test was made with radium and with same result. I then heated one of the pastilles so as, in a measure, to dehydrate it, and the color change was very decided. I feel justified, therefore, in concluding that the platino-cyanide indicators cannot be safely used in New York City during the summer season when for eight or ten weeks the relative humidity rarely falls below 80 degrees, and often runs up to 90 degrees or more.

There is still another objection to the platino-cyanide, as the color change must be examined by daylight, not by artificial light.

It occurred to me a few months since to measure the intensity of the electro-static field surrounding a Crookes tube during an exposure, thinking that it might possibly be a convenient means of estimating the energy that was being given off.

To do this, I took a brass ball about one and one-quarter inches in diameter and supported it about four inches from the wall of the tube, and just within the circle of rays issuing from the anterior hemisphere. The ball was then connected by a conducting cord about eight feet long to the charging device of an electroscope. As soon as the current passed through the tube, the aluminum needle or foil indicated the charge, and the angle was easily read off on the scale.

For this purpose, I found both Braun's electroscope, which is graduated in volts, or the writer's, which is graduated in degrees of an arc, very convenient, and I found that the angle varied directly with the current passing through the tube. It further showed whether the tube was running steadily or not, and also indicated any notable change in the vacuum.

I have not as yet been able to give the matter a thorough therapeutic test, in so much as I am not a frequent user of X-rays, and I present the matter now as a preliminary note, in order that those who use the rays more frequently may ascertain its practical value in this connection.

P. S. Since the foregoing was written, I have received the August number of *The Archives of Physiological Therapy*, and in it find an article by Columbo which fully bears out my own conclusions as to the unreliability of the platino-cyanide methods, and I also find, somewhat to my surprise, that others have experimented with measurement of the intensity of the electro-static field. The details of this will be found in a note by Dr. E. Albert-Weil in the *Journal de Physiotherapie* for February 15, 1905. The procedure is that of M. Francois, and involves the use of an electrometer and a battery of seventy Clark cells.

THE TUBE IN ROENTGEN THERAPY*

BY ENNION G. WILLIAMS, M. D., OF RICHMOND, VIRGINIA

IT is not my purpose in this paper to give a complete discussion of the tube, but simply to discuss briefly those points that have appeared to me to be of the most practical value in therapeutic work.

The factors to be considered in a treatment are the duration and frequency of the exposure, the distance of the anti-cathode from the surface exposed, the current supplied to the tube, and last, but by no means the least, the character and conditions of the tube itself.

It is within the tube that the measurable electrical energy is transformed into the radiant energy of the Roentgen rays, which is incapable of accurate measurement. The energy or the influence given off from a tube is made up of rays of different physical and physiological properties; and these particular properties are dependent upon the construction of the tube and upon the condition of the variable factors of the tube at the time the current of electricity is supplied to it.

For a thorough understanding of the tube it is well to review the construction and the various features about a tube together with their purposes and significances.

The length of a tube is of importance because the farther the external terminals of a tube are apart, the less likely is the current to arc across from one to the other, thereby involving loss of electricity which would otherwise pass through the tube to be transformed into X-rays. This invisible loss of electricity in short tubes may be considerable and render the reading of the milliammeter erroneous so far as it is supposed to measure the electricity transformed. The long tubes, therefore, possess a distinct advantage.

The size of a tube has a decided influence in determining the ease or quickness with which the degree of vacuum changes. The larger the internal capacity of a tube the less influence has a certain amount of absorption or giving off of gas upon the total amount present, or in other words, the degree of vacuum.

The thickness of the glass opposite the anti-cathode is a very material factor. Glass is very impervious to the rays and a slight increase in thickness seriously affects the therapeutic efficiency of a tube. When we see a few layers of gauze filter out physiological rays we can realize how much influence even a thin layer of glass can have. The lack of efficiency of some tubes, under apparently the same conditions otherwise, may doubtless be explained by the thickness or quality of the glass opposite the anti-cathode.

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* Read at the Seventh Annual Meeting of the American Roentgen Ray Society, at Niagara Falls, N. Y., August 29, 1906.

The size of the cathode appears to be immaterial. It has been found that aluminum is the best metal with which to construct the cathode because it gives off particles under the electrical discharge less readily than other metals.

The cathode rays are projected in lines perpendicular to the surface of the cathode. The surface of the cathode is made concave and the rays from it would consequently tend to come to a focus at its centre of curvature, but the particles composing the rays being similarly charged electrically are mutually repellent and so do not come to a focus until about twice the distance of the centre of curvature from the cathode. At this distance is placed the anti-cathode to receive the impact of the cathode rays. By the impact of the material particles composing the cathode stream upon an impenetrable substance is set into activity a series of ether waves known as the X-rays. The anti-cathode is made of platinum because of its density, impenetrability and its high fusing point. The heavier the anti-cathode the heavier the discharge of cathode stream it can stand without the temperature of the metal being raised too high. Since in therapeutic work heavy discharges of the cathode stream are seldom if ever required, it is not necessary to have a very heavy anti-cathode. The anti-cathode should, however, be sufficiently thick to prevent any cathode rays from being lost by penetrating the platinum. The whole efficiency of the cathode stream should be converted into X-rays and given off from the front surface of the anti-cathode.

The cathode and the anti-cathode should be so placed that the line of the cathode stream should be so far from the walls of the tube that it is not interfered with by the strange static influence due to the wall or by return of the positive particles. This is a possible error that tube makers are not likely to make.

In some tubes the anti-cathode serves as the anode and in others the two are separate. The advantage of these being separate is that in case of reverse discharge there is less disintegration and shooting off of minute particles of platinum which deposit on the walls and which tend to absorb the gas and so to increase the degree of vacuum. It is, however, better to have the anti-cathode attached to the anode, for it is found that there is in such case greater efficiency to the rays.

The kind of gas within the tube is apparently of no consequence since the atoms or molecules that compose the cathode stream are not those composing the gas, but sub-atoms or electrons which are apparently the ultimate subdivisions of matter.

The degree of vacuum or the relative quantity of gas in the tube is the factor of the greatest moment concerning the tube, for it is that which determines the resistance within the tube and this in turn to a great extent determines the penetrative quality of the rays and at the same time the quantity of electrical energy allowed to pass to be transformed into radiant energy.

In therapeutic work a most important consideration is to estimate the dosage. This can be approximately estimated only when the character of the tube is constant. To maintain a constant vacuum within a tube it is most desirable that a tube used in this class of work should not be subjected to the conditions which are so liable to bring about a change of vacuum, such as the heavy discharges commonly used in radiographic work. The heavy discharges raise very greatly the temperature of the metal of the anti-cathode and also of the glass of the tube. This alters the absorption and elimination of the gas contained in metal and glass. The heavy discharges also increase the shooting off of the particles which deposit on the surface of the glass and absorb the gas, thus permanently raising the vacuum.

The regulating devices are, of course, exceedingly useful in maintaining the proper vacuum. They cannot and should not alone be depended upon in the effort to maintain a constant vacuum. This should be done rather by avoiding heavy currents in therapeutic work. My own best therapeutic results have been obtained by using a current of from one-half to one and a half milliamperes and the resistance in the tube estimated by an equivalent spark gap of from two and a half to six inches. With such a current a tube will maintain a fairly constant vacuum for a comparatively long time and need very little regulating. Should an exposure of more than ten minutes be needed it is well to let the tube have an interval of a few minutes' rest.

It is best to have tubes of different degrees of vacuum than to attempt to regulate the same tube to suit different cases.

As to the physiological actions and the therapeutic uses of tubes of different degrees of penetration, I am in thorough accord with Dr. R. H. Boggs in his article on " The Adjustment of X-radiations for Various Physiological Effects," published in the St. Louis Medical Review, November 11, 1905, in which he describes the five degrees of penetration with their therapeutic indications.

In conclusion: for therapeutic work it is exceedingly desirable to measure the dosage; to do this we must have as constant as possible the factors that are not measurable and to have variable only the factors that are measurable. The duration, distance and electrical energy supplied to the tube are measurable, and the conditions of the tube are largely not capable of exact measurement, and therefore they should as far as possible be made constant.

One requisite of a tube for therapeutic work is that the total amount of electrical energy supplied to the tube should be transformed into radiant energy with as little loss as possible. This is accomplished by the following means: first, that the external terminals of the tube should be so far apart that there is a minimum passage of electricity around the tube instead of into it; second, the glass of the tube opposite the anti-cathode should be exceedingly thin, for even the thinnest glass filters out a material amount of therapeutic efficiency; third the anti-cathode should be made of such material and thickness as to prevent any penetration of the cathode or

X-rays thereby involving a loss of effective rays. This is an almost inconsiderable factor.

The other requisite of a good therapeutic tube is that it should be capable of maintaining a constant vacuum. This is accomplished, first, by having the tube of such size that the absorption or elimination of the gas by or from the metal or glass will not greatly alter the relative amount in the tube or the degree of vacuum; second, the electrical discharge sent through the tube should never be so strong that the temperature of the anti-cathode or the glass walls is raised so high as to alter their absorption or elimination of gas.

The tubes used for therapeutic purposes should not be subjected to the heavy discharges common in radiography. The same tubes should not be used for both kinds of work. It is better to have different tubes for the various classes of therapeutic work than to attempt to adjust the same tube to suit every case.

FURTHER EXPERIMENTAL RESEARCH CONCERNING THE DIRECT, INDIRECT, AND SECONDARY RAYS *

BY LEWIS GREGORY COLE, M. D., OF NEW YORK CITY

IN the May, 1905, issue of the *Archives of the Roentgen Ray*, was published an article on " Experimental research concerning direct, indirect and secondary skiagraphic rays." An understanding of that paper is essential and, as the paper was never read before a society and was published in an English paper, I feel that I must incorporate some of it in this paper.

It was in my early practice with the low vacuum method that I secured on several occasions results of so startling a nature that it led me to investigate more closely the conditions which produced them. In the course of this investigation I obtained unmistakable evidence that better work could be accomplished with an old than with a new tube, and that an old, either high or low vacuum tube would, under other favorable conditions to be dealt with later on, give off a certain ray or class of rays, unobtainable from a new tube under any conditions, and in which were combined the best characteristics of both the high and low vacuum methods, giving perfectly clear outline and marked detail in all parts with short exposure. This I called the " Ray of Selective Absorption."

The Roentgen ray, considered in the form in which it leaves the tube, has, *in its application to skiagraphy*, generally been regarded as homogeneous in its character. To so regard it is, I believe, a serious misconception of its true nature, which is in a degree responsible for not only many of the unsatisfactory results obtained, but for the inability on the part of the skiagrapher to account for many of those oft-recurring phenomena which are so mystifying.

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* Read at the Seventh Annual Meeting of the American Roentgen Ray Society, at Niagara Falls, N. Y., August 29-31, 1906.

In the article written in May, 1905, I said, " I shall assume, whether rightly or wrongly, that the rays in their primary form have their inception at the focal point of the anode, where they may or may not be practically *identical* in their nature, and from whence they radiate in direct lines to the walls of the tube throughout its anterior hemisphere."

Roentgen recognized the fact that the X-rays, as a whole, were capable of setting up secondary rays in substances with which they come in contact outside of the walls of the tube, a characteristic which has been more fully investigated by Professor J. J. Thomas to the extent of having determined that the degree of this action is in direct proportion to the density of the object in which it takes place.

But, as far as I have been able to discover, no effort has been made to demonstrate the occurrence of this, or a similar process, in the walls of the tube itself, although I am aware that Roentgen's original conception of the X-rays was that they were of a secondary nature and produced by the cathode streams in contact with the glass not having a metallic target to be focussed on. I am convinced that there are two forms of rays emanating from the tube, their chief distinguishing features being, so far as they affect skiagraphy, as follows:

1. The source of origin. (*a*) The direct ray from the focal point of the anode. (*b*) The indirect ray from the wall of the anterior hemisphere of the tube.

2. The direction of the line of flight. This is in the case of the direct rays being a continuation of their original line of projection from the focal point of the anode, and in the case of the indirect rays being at various angles therefrom.

My belief in this led me to the study of the life history of a number of tubes. In the new tube we have perfectly clear glass of ordinary brittleness and smooth inner surface. Upon its first excitement the anterior hemisphere lights up with a bright, yellowish-green fluorescence; this color gradually changes, as the seasoning process advances, into a purplish-yellow of less brilliancy. This light, Dr. Stover, of Denver, Colorado, calls the " sunflower " light, because of its rich, mellow color. *Eventually, in a very old tube there is scarcely any fluorescence whatever*, and Roentgen spoke of this as a dead tube.

After a new tube has been used a few times, the glass begins to assume a purple color in its anterior hemisphere; this increases with the use of the tube and there obtains a smoky appearance of the glass of the posterior hemisphere. This purple color of the anterior hemisphere has been regarded by some as a result of a platinum deposit of the inner surface of the tube. I do not believe this to be the case and further on shall give my reasons for this disbelief.

In the new tube a heavy discharge of current will heat the anode red-hot, while the same discharge in an old tube will have no effect. In a fluoroscopic examination with a new tube, it is necessary to place the object near the screen in order to get a clear outline of the bones, but as the tube becomes seasoned this distance may be increased, until in an old tube the object may be held at some distance and the bones will still appear black with clear, well-defined edges, and the medullary cavity showing.

In the new tube there is not a brilliant fluorescence of the exposed parts of the screen, but a diffusion of light over its entire surface and a corresponding lack of contrast between the various degrees of density of the interposed object.

The crisis of the tube. After a tube has been in daily use for three or four months to the extent of six or eight skiagraphs and possibly a treatment or two each day, it will be found on some particular day that the vacuum is very high; it refuses *gradually* to respond to the usual methods employed, but after repeated application in lowering it, it seems to drop suddenly from a high to a low vacuum and there will be purple rays between the cathode and anode. It recovers, however, from being lowered, and, if treated moderately for a few days, will pass through this stage and be a most useful tube for six or eight months, or even a year or two.

During the crisis the tube acts most peculiarly. If the face of the anode is turned to the side in one direction, preferably north, or parallel to the magnetic current, you will get a very effective ray from the tube with a 2 or 3-inch spark; then if turned towards the earth, it will back up a 12-inch spark without giving off any rays; by simply returning the tube to its former position it will again give an effective ray on a 2-inch spark. This I have demonstrated to the hospital staff. It occurs only on one or two days in the life history of each tube, and usually after the tube has been used for three or four months. This fact I have noticed in every tube which has been used for that length of time. This is what I consider the crisis of the tube. An explanation of these phenomena I cannot give, but that they occur I am absolutely certain, and that the tube is more effective after passing through this stage I am equally sure. Carrying the tube up to and through this critical period may be termed " seasoning " it.

The vacuum may be raised in a low tube by making and breaking the current repeatedly, preferably by approximating and withdrawing the secondary terminals. This I know will raise the vacuum of the tube, but its *modus operandi* I cannot explain. If, each time a new tube is used, it be allowed to rest for a day or so, it will bear a greater amount of current without the vacuum being impaired, and eventually, instead of the vacuum dropping, it rises, and the character of the ray improves steadily. Up to this time the power of penetration of the soft parts, and the amount of spark it backs up, seem to be in proportion to the height of the vacuum of the tube.

Changes in the gas in the tube. During and presumably as a part of this seasoning process, the gas remaining in the tube seems to undergo some change productive of a higher vacuum. When a tube which has undergone this process is re-exhausted, it will act as a new tube as regards the falling of the vacuum during the period of excitement. If, however, the tube is not re-exhausted, this change continues to increase with the use of the tube until a 12-inch spark, or even a greater, is necessary to effect an excitement, which even then will continue only a few seconds, unless the vacuum be repeatedly lowered by heating the palladium point; but even with this high vacuum, as before stated, the bones during the interval of excitement of the tube appear very black in the fluoroscopic examination with an accompanying great penetration of the soft parts, a combination to which I then applied the term: "The ray of Selective Absorption."

The difficulty encountered in exciting a tube which has reached this condition, owing to the discharge of the current around the surface of the tube, is generally attributed to the presence of the above mentioned platinum deposit on the inner surface of the tube, acting as a conductor of the current between the poles. While this deposit may exist, I doubt if it so affects the discharge, for the reason that the tube, if re-exhausted, without undergoing any known process calculated to remove such deposit may be excited by a moderate energy, the vacuum dropping as in a new tube and without the immediate recurrence of the phenomenon.

A seasoned tube produces a brilliant fluorescence of the screen on its exposed parts, this being much diminished where the soft parts interpose and an almost entire absence of light where the bones interpose, with marked detail throughout the entire skiagraph.

If the new tube backs up six or seven inches of spark, the bones are nearly obliterated and the edges are blurred and indistinct, while an old tube may back up a 12-inch spark without increasing the penetration of the bones enough to perceptibly dim their shadow, and in an old tube even the small bones of the hand will appear distinctly black, regardless of the length of spark which it backs up, and the soft parts will each absorb a certain amount of light.

In the meantime, the glass of the tube has become brittle and rough on its inner surface in the anterior hemisphere upon which the radiations from the anode have acted directly, while the glass of the posterior hemisphere is not perceptibly changed from its original texture.

As to the cause of the discoloration of the glass of the tube, I am of the opinion that *if* this *is* due to the presence of any metallic substance in any form, it is of aluminum rather than of platinum, for the reason that in the anterior hemisphere, the parts of the tube immediately adjacent to the aluminum parts are more highly colored than others, while the portion of the lower half of that hemisphere, which is shielded from the direct rays from the platinum secondary cathode by the intercepting anode, has less discoloration. The different color of the two hemispheres, the purple of the anterior and the brown of the posterior, might be attributed to the different manner in which the metallic particles are disposed upon or throughout the glass. The glass of the posterior hemisphere being unexposed to the direct discharge from the anode, undergoes less molecular disturbance, and the metallic particles are simply deposited on the inner surface of the tube, while the direct discharge from the anode upon the walls of the anterior hemispheres sets up an intense molecular action in the glass, which permits of the metallic particles being carried into and even through the glass. That some of them are carried through the glass is indicated by the fact that this same purple discoloration takes place in pieces of glass which have been exposed for some time to the direct action of the rays outside of the walls of the tube.

That the molecular action above referred to results in a molecular re-arrangement in the glass of the anterior hemisphere is a further proposition which, while beyond absolute proof by any means at my command, is so strongly suggested as to at least be worthy of most careful consideration. This re-arrangement, it seems to me, is somewhat similar to that occurring in steel which has been magnetized. Whether this consists simply of an alignment of the axes of the molecules in parallel with the normal direction of the discharge from the anode, this taking place slowly and progressively with the use of the tube, or whether it consists of some more complex action, that tends to a continuance of the original lines of force of that discharge, is a problem, the solution of which is outside of my domain.

The lower the fusible point of the glass, the more susceptible it is to the action which results in the discoloration.

The fluorescence in the tube composed of glass of a high melting point is of a brighter and more greenish hue than that occurring in glass of a low melting point, while glass of an exceedingly low melting point fluoresces blue. The variety of results thus obtained is apparently due either to differences in the chemical composition or the molecular construction of the different glasses composing the respective tubes, or both.

The glass of the anterior hemisphere of the tube, exposed as it is to the action of the direct discharge from the anode, becomes, as already stated, more brittle than the glass of the posterior hemisphere. In the case of a seasoned tube becoming punctured in its anterior hemisphere, that part of the glass immediately surrounding the puncture, after being subject to a degree of heat necessary to the process of repair, is apparently restored to the condition of the glass in a new tube and resumes all the characteristics thereof; the color disappears, it fluoresces a bright greenish-yellow, and probably is less brittle.

All these facts, it seems to me, tend to verify the theory that some change takes place in the molecular formation of the glass which, as it progresses, permits the free passage of a continually increasing volume of the direct rays or the capacity of the glass to generate indirect rays. When this change becomes practically completed as in a seasoned tube, we are able, all other conditions being equal, to secure a very large proportion of direct rays.

Hitherto a skiagraph lacking in contrast, but with marked density in all parts, has been considered as due to a high degree of penetration. Considering, however, the nature of these indirect rays, and the fact of their ability to set up secondary rays in all objects with which they come in contact in the surrounding atmosphere, and especially in the soft parts of the tissue which they encounter, it can be readily understood that they thus reach the plate from all directions, projecting themselves at various angles beneath the subject, behind the bones or other substances, causing thereby an entire lack of definition of all parts and an obliteration of detail in the soft parts. We are thus forced into a recognition of their baneful effects, and of the fact that to them, rather than to the degree of penetration, is due the imperfections above noted.

On the other hand, the direct rays, reaching the plate as they do in established lines from a fixed or ascertainable point, and being absorbed by the tissues interposed, presumably in proportion to the amount of solids contained therein, give a clear outline and perfect detail, even of the softer tissues, and with a preponderance of these rays we are able to show not only the bones and muscles, but the kidney and spleen, the walls of the intestines, and the arteries, and in cases which I have recently made, even the blood within the veins, showing the anastomoses around the knee and elbow.

The indirect rays are caused by the deflected cathode stream that has not been converted into X-rays at the focal point of the anti-cathode, but is carried along with the direct rays until they strike the wall of the tube and are there converted into what I termed indirect rays.

First. As originally illustrated by Roentgen, the cathode stream caused a brilliant yellow fluorescence of the glass when focussed directly on it.

Second. Prof. J. J. Thomson describes an experiment in which he shows that all of the cathode stream is not converted into X-Rays at the focal point, but that some of it is deflected.

Third. The cathode stream causes great heat when focussed on glass. That part of the tube behind the target is not heated to the same degree and does not fluoresce like that part exposed to direct X-Rays and the deflected cathode stream.

Fourth. The similarity of the point in the posterior hemisphere near the shaft of the anode where a few of the cathode rays strike the wall of the tube and the fluorescence of the anterior hemisphere were the things that led me to this line of investigation.

The X-ray, either direct or indirect, does not generate any amount of heat in passing through the glass. Therefore the heat of the glass tube is not caused by the X-rays generated at the focal point of the anode, and is not caused by the heat radiated from the anode, because the posterior hemisphere is colder than the anterior.

Fifth. In a tube so constructed that a piece of tin, aluminum or glass shields some part of the anterior hemisphere from the focal point of the anode, that part of the glass so shielded does not become hot, does not fluoresce, and does not give off indirect rays. Heat is generated only when the cathode stream is converted into X-rays.

In a low vacuum tube more of the cathode stream is converted into X-rays at the focal point of the anode than in a high vacuum tube, and in a very high tube the cathode stream deflected from the anode is not converted into X-rays at the wall of the tube, but is again reflected to some other part of the tube.

Glass exposed to the direct X-ray, and the cathode stream direct, or the deflected, undergoes the molecular activity and change described in an earlier paper published in the *Archives of the Roentgen Ray*, May, 1905, and does not generate the amount of indirect rays that new glass does. The thinner the glass the fewer indirect rays are generated.

A coil and interrupter so constructed as to generate a current of very high voltage with low amperage will cause more of the cathode stream to be deflected than one with a lower voltage and higher amperage. The tuning of the apparatus is, I believe, the regulation of it, so that the greatest amount of the cathode stream is driven against the anode at about the same velocity. A tube so constructed as to cut off all deflected cathode stream is the first thing we think of, but the ideal is a coil, interrupter and tube so constructed that the entire cathode stream will be converted into X-rays at the focal point of the anode.

Resume

The direct rays are generated at the focal point of the anode by the impact of the cathode stream, from which point they pass in all directions in front of the anode and are absorbed by the tissues interposed presumably in proportion to the amount of physiological solids they contain, giving clear-cut, well-defined shadows even of the very soft tissues. Some secondary rays are generated by the direct rays.

The *indirect* rays are generated at the wall of the tube by the deflected cathode stream which has not been converted into X-rays at the focal point of the anode, but are carried along with the *direct* X-rays to the wall of the entire anterior hemisphere, where they are converted into indirect rays. These indirect rays pass in all directions from the wall of the tube, behind the target as well as in front, and owing to the large area of the source of origin and the secondary rays they generate in the soft parts. They cause a blurring of the outlines of the bones and soft parts. The secondary rays are caused as much or more by the indirect rays than they are by the direct rays.

A tube so constructed that none of the deflected cathode stream can strike the walls of the tube will not fluoresce and will not generate indirect rays. But the ideal is to have a tube, interrupter and coil so constructed that the entire cathode stream will be converted into X-rays at the focal point whereby the X-rays will be purely direct rays.

Attempting a Physical Explanation of a Biological Process. (*Von R. Sleeswijk, Zeitschrift fur Electrotherapie, August*, 1906.) The author calls attention to the well-known fact that in the process of cell division, two poles develop. One of these is the positive element and the other is the negative element, just as we have positive and negative electrical elements, and that if an element or an energy is separated it must find a new energy with which to unite. This appears to be the general process of life.

S. T.

THE TEACHING OF ROENTGENOLOGY IN MEDICAL COLLEGES*

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THE value of the Roentgen rays as a diagnostic and therapeutic agent needs neither defense or demonstration before this Society. Every roentgenologist has seen sufficient evidence to convince him of the utility of Roentgen diagnosis and Roentgen therapy. It is undoubtedly true, however, that the mistakes, failures and injuries incident to the experimental stage of the work as well as the lack of knowledge of the effect of the rays at that time, have done much to discredit roentgenology among many members of the medical profession.

The increased knowledge of the action of the rays, physical, chemical, physiological and pathological, has been of such a nature in recent years that we can now say truthfully that almost in direct proportion as is the knowledge of the subject exact and the technique correct, may the utility of Roentgen rays be demonstrated.

Yet, as a science, roentgenology is still in its infancy. We have still a great deal to learn. Careful study, comprehensive research, intelligent interpretation and more exact methods of work, will bring broader application and increased utility. At present we have reason to hope that our knowledge of the effects of the rays upon the living animal cell is sufficiently extensive, so that most of the dangers may be altogether avoided.

Since roentgenology has come to have a recognized place in diagnosis and therapeutics, and since satisfactory results are obtained only through intelligent use and correct technique it is of importance that the physician should be well informed on the scope and limitations of the subject. Especially is this true since the physician of the future, no matter how he may wish to avoid it, will find himself under the necessity of using the rays either for diagnosis or treatment, not once, but many times during the course of his professional career.

Whether or not he chooses to do his own Roentgen work, or to refer it to a roentgenologist, a knowledge of the application of roentgenology to clinical work will be a necessity. The medical college of the present day must, therefore, give some attention to teaching the use of the Roentgen rays. I believe it is important in this connection to confine the instruction to the principles of the subject, as far as we know them, and to avoid the exploitation of pet theories. It will not be possible to make Roentgen experts, nor will it be possible to enable each student to become proficient in technique. The skill he must acquire for himself, but let there be a knowledge of principles preceding it.

What the medical student should know is what can be done by the use of the Roentgen rays in therapeutics and diagnosis. He should also be given sufficient instruction to enable him to select such apparatus as will meet the needs of the roentgenologist, and to know that he must devote himself to a thorough understanding of the apparatus and the conditions under which he labors, in order that he may develop a correct technique. In order that he may have a clear idea of the principles of roentgenology, the student must possess a general knowledge of radiophysics and of the physical principles of the apparatus employed. Demonstrations of apparatus, under the different conditions which must be met, and of the methods of controlling and regulating the apparatus should be given in connection with a discussion of the physics of the subject.

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* Read at 'the Seventh Annual Meeting of the American Roentgen Ray Society, at Niagara Falls, N. Y., September

Given medical students of the present day where entrance requirements include a general knowledge of physics this instruction is comparatively easily and rapidly imparted.

Of much greater importance, however, is instruction in the practical uses of the rays. In diagnosis, the student should be taught how to make a fluoroscopic examination under conditions necessary for his own safety and the safety of the patient. The importance of shielding, of diaphragming, and of making the examination within a proper time limit should be emphasized. He should also be taught how to interpret, in a general way, what he sees upon the screen, that it is not a picture but a record of the densities traversed by the rays, in passing through the structure under observation. He should be taught the purpose and the value of a fluoroscopic examination, and the limited usefulness, the liability to error and the absolute insufficiency of relying upon it alone as a diagnostic instrument, especially where detailed information, such as can be given only by the radiograph, is necessary.

The advantage of the fluoroscope in studying motion, and in giving a general idea of relationships, cannot be denied. Yet one should have a clear idea of the limited use and extended danger in a too free use of the fluoroscope.

In radiography the student should be taught to recognize a radiograph which is reliable for diagnostic purposes, and the necessity for more than one radiograph of the pathological condition. Radiographs made at different angles or stereoscopically, both of the pathological condition and of the corresponding normal anatomy of the patient, wherever possible, should be presented for interpretation. It is especially desirable that the student should understand the value of correct interpretation, not only for the purpose of treating the condition more skillfully but so that he shall realize the importance of this in medicolegal cases where radiographs are submitted as evidence. He should also understand the conditions under which distortion is produced and never allow a radiograph showing an apparent deformity to prejudice his mind against a case where good functional results were obtained.

The careful study of a series of radiographs, of both normal and pathological conditions, with especial reference to interpretation, is of the greatest value in a course in roentgenology, because it combines both practical and educational value in a high degree. The real value of Roentgen diagnosis can be better demonstrated in this than in any other way.

If a majority of the plates studied are those of patients seen in the clinics, so that the diagnosis and methods of treatment are fresh in the mind of the student, so much the better. If some of the radiographs are made in the presence of the section in roentgenology, the detailed methods of radiographic procedure demonstrated, these radiographs studied, and the treatment and recovery of the patient be kept under observation, it will be of still greater value. The careful and extended study of a limited number of well selected cases will prove of greater value than a superficial study of a great many.

In Roentgen therapy the student should be instructed in the effects of the rays upon the various tissues, so far as is known, and to what extent pathological conditions yield to irradiation. The application and limitations of the Roentgen rays in therapeutics should be carefully presented. Demonstrations of the method of treating different conditions should be given, and the reasons for the technique presented. Methods of measurement, both of current strength used to excite the tube and of the penetration of the rays as measured by the Benoist and Walter instruments, should be demonstrated. The quantitative measurements of the rays, inaccurate and unsatisfactory though they may be, should be presented, and the necessity for more accurate methods of dosage than a time unit should be brought to the student's attention.

Patients receiving treatment should be under observation by the members of the class for as long a period of time as circumstances will permit. In demonstrating the methods of treatment in a Roentgen ray clinic it is also of fundamental importance that the diagnosis should be accurately determined, and a microscopic examination made in every case possible.

The time which may be given to the subject will necessarily vary with the conditions which confront the roentgenologist. A very satisfactory way of presenting the subject is to have the senior class divided into small sections, and the work given by lectures and demonstrations for one hour or two hours per week, for either a semester or half a semester. From twelve to twenty hours would be required to present the essentials of the subject, without giving it any more attention than its importance demands.

Through correspondence with the Deans of most of the American Medical Colleges, I find that at present some attention is given to teaching this subject in nearly every one. The hospitals of even the smaller colleges are, as a rule, equipped with Roentgen apparatus for both diagnosis and therapy. In many of the colleges the instruction is comprehensive, systematic and connectedly presented. I believe it is unfortunate to have the instruction presented intermittently by different clinical men, at only such time as the fancy presents itself. It is, of course important that the teaching be correlated with the clinical instruction as far as possible, but it is a saving of time and is of greater value to the student, if the instruction be presented by a competent roentgenologist.

The success of the instruction depends to no little extent upon both the mental equipment of the instructor and the equipment of his laboratory. He should be practical, and be possessed of both a knowledge of the fundamental physics and the medical sciences. He should be familiar with the literature of the subject. He should keep in touch with the work of the different clinics, and with the work of other roentgenologists. A careful record should be kept in the laboratory of all work done, the results obtained, the microscopic examinations made, and all physical measurements obtainable. It is only by careful, systematic work and record keeping that we may hope to place roentgenology on a strictly scientific basis.

But it is not the medical student alone who needs instruction in the applications of the Roentgen rays. There are many physicians whose doubts might be removed and who would make use of the rays, were they convinced that such use would lead to better results in their practice. But they are not to be convinced by flattering reports in medical journals alone. It is the duty and it should be the pleasure of every roentgenologist to present to his medical society such cases and such demonstrations as will lead to a just and true appreciation of the work of this agency.

Though he be an enthusiast, the roentgenologist should scrupulously avoid making hasty conclusions, extravagant claims or of making positive diagnoses from his plates except when absolutely justified in doing so. It is better to err on the side of conservatism than to shake the faith of his colleagues by premature conclusions. There should be a united effort on the part of roentgenologists to give to the medical profession an accurate knowledge of the use of the Roentgen rays and to keep the work within the boundaries of its legitimate field.

ELECTROTHERAPY

Results of Auto-conduction by Spiral Resonators in Arterial Hypertension. Two resonators are placed parallel to each other in such a way that their turns are in the same direction in each and with the discharge of the condensers not circulating in a single external turn, but in 13 or 14 external turns. With this arrangement no effluvia are produced, but there is an enormous oscillating field around each spiral and the space between the two spirals is the seat of the maximum effects of induction which can be obtained. Thus, a single turn of rubber wire placed in this field suffices to light up the several 12 to 20-volt lamps in series. He uses this field for auto-conduction in the same way as the auto-conduction gauge and with similar results. Two spirals are placed parallel and at a distance of about 60 centimeters. They are both wound in the same direction. The wire from one external armature of the Leyden jars passes to the external extremity of the first spiral, and from the 15th turn of this spiral the wire passes to the external extremity of the second spiral, and from the 15th turn of the second spiral it passes to the external armature of the other Leyden jar. The patient is placed between the two spirals in such a manner that the axis of his body follows the curvature of the external turns of the two spirals, sitting in a chair, for instance, with the knees bent up by means of a stool placed under the feet. Fifteen patients have been treated by autoconduction in this way and showed a notable diminution of the arterial pressure at the end of the treatment. Fifteen or twenty treatments of twenty or thirty minutes each are generally enough. In cases where the patient has suffered from general symptoms — vertigo, fatigue, dyspnœa, loss of appetite, sensation of cold and variable symptoms — the patient has almost always felt decidedly better after the sixth or seventh treatment.

Radial Paralysis Caused by a Fracture of the Humerus. Electrical Examination of the Denuded Nerve. Recovery in Spite of an Unfavorable Prognostication. (*Dr. M. Chanoz, Archives d'Electricite Medicale, September* 10, 1906.) The case was that of an old man with a fracture of the humerus, with some little displacement of the fragments and immediate paralysis of the entire distribution of the radial nerve. At an operation performed five weeks after the injury the nerve was freed from the callus and an electrical examination of it was made. Bi-polar stimulation of the exposed nerve, either above or below the zone liberated from the callus, produces no muscular contraction in the region controlled by the radial nerve. The prospect of recovery from the paralysis accordingly, seemed very slight. Before the incision was made an electrical examination by means of electrodes applied to the surface of the arm showed that faradic excitability was completely abolished in the radial territory of the forearm. The triceps was a little less excitable than on the sound side. Galvanic excitability of the active electrode placed on the point of election of the muscles produced slow contractions. The contraction compared with the same intensity for either pole. Faradic stimulation applied to Erb's point over the parachial plexus required a stronger application to produce contraction of the triceps than on the sound side. Without any special treatment this patient gradually recovered the use of the paralyzed muscles.

S. T.

RADIODIAGNOSIS

Radioscopic Procedure for Extraction of Needles. (*F. Wullyamoz, Archives d'Electricite Medicale, September* 10, 1906.) Guided by the fluoroscope, he draws a pencil line parallel with the direction of the needle and the same length as the needle. Then, by electric light or gas light, he makes a short incision through the skin at right angles to the direction of the needle. Then, using the fluoroscope again, he pushes in a pair of forceps through this short incision, grasping the needle at its middle point, and then by daylight or artificial light he makes a short incision over one end of the needle, and then using the fluoroscope again and twisting the forceps somewhat he presses this end of the needle into the wound so as so grasp it quite easily with another pair of forceps, then lets go with the first pair of forceps and proceeds to extract the needle by pulling in the direction of its long axis by means of the forceps which have hold of its end. *S. T.*

RADIOTHERAPY

The Effect of the Roentgen Rays upon the Skin; Roentgen Dermatitis and Its Therapy. (*Dr. Weik, Zeitschrift fur Electrotherapie, August,* 1906.) The effect of the Roentgen rays depends upon the amount absorbed. The reaction to the rays occurs after a latent period, and the duration of this period is in inverse proportion to the intensity of the rays. A sufficient quantity of rays to produce the first degree of reaction (erythema) will show its effect in from two to three weeks. A quantity sufficient to produce the second degree shows its effect in from one to two weeks, and a quantity sufficient to produce the third degree (mortification, ulcer with the formation of scar tissue) gives evidence in a few days.

When the treatment is given in divided doses the duration of the latent period is difficult to estimate and therefore an interruption in the treatment should be allowed sufficient for the effect to become manifest.

The above remarks refer particularly to the acute dermatitis. We have also a chronic dermatitis which usually affects those who work in the field of the rays almost continually and receive repeated small doses. A third variety, first noticed by Holzknecht, is the erythema which develops a few hours after the exposure and is considered by him to be due to other than the Roentgen rays; it occurs especially with tubes that give a blue color. This reaction disappears in a few days. Then there are people with idiosyncrasies to deal with.

The histological appearances of the skin, after treatment with divided doses sufficient to produce loss of hair and atrophic appearances of the skin, is as follows: in the corium is found infiltration about the vessels with round cells and occasional polynuclear cells, and also in the rete is found some infiltration. The small vessels seem to be dilated.

We must conclude that the cell elements of the skin are primarily affected and that the musculature, connective tissue and elastic tissue are not at all affected, or only secondarily.

The chronic Roentgen dermatitis of the roentgenologist and the manufacturer develops very slowly and is most persistent. It is increased by disinfecting agents and developers.

The symptoms of the dermatitis of the radiologist are described similarly by all authors and consist of at first a diffuse redness and swelling of the skin, reminding one of the appearances of a frost-bite.

This is due to a deep-seated hyperæmia. These blood changes vary from better to worse, but finally become stationary, and are aggravated in proportion to the amount of exposure.

The next change is the formation of hyperkeratoses. These occur (1) in diffuse form, as an abnormal accumulation of the epidermis; (2) in circumscribed form, as warts or swellings;

(3) in further effects as the formation of ragades.

Further symptoms are the dilatation of the vessels, the falling of the hair and the crippling of the nails, followed by atrophy of the skin and loss of function of the sweat and oil glands. Histologically in such cases is found in general a thickening of the layers of the cells of the epithelium. The spindle cells have increased in volume, and show an interstitialœdema. Leucocytosis is absent and the interstitial substance consists of serum. At the bottom of the ragades are often found carcinomatous cells, and on this account they are difficult to heal. Cases are known too in which skin cancers became engrafted upon this chronic Roentgen ulceration.

The best therapy here, as elsewhere, is prophylaxis.

The most difficult of all forms of Roentgen dermatitis is that of the roentgenologist. Here we are reminded that just as developers increase the inflammation, so all reducing agents will do harm. To this class belong ichthyol, sulphur, resorcin, etc. and these must be avoided in the treatment.

Toward the removal of the hyperkeratoses we must direct our attention as follows: (1) The hands should be bathed in hot water so that the epidermis becomes saturated with water. (2) Pack in impermeable material, such as guttapercha, rubber, Billroth-Battist, or cover with zinc oxide plaster. (3) Good effects are also obtained by bathing or applying wet dressings of carbonate of soda or potash, or soap baths. (4) The application of fats to increase the elasticity of the horny layer and, to a certain extent, replace the lost fats due to the destruction of the secreting glands.

The hyperkeratotic points may be touched with hydrogen peroxide. Better apply the baths and the dry methods during the day and the salves at night. *G. E. P.*

The Unit I — A New Unit of Quantity of X-Rays. (*H. Bordier and J. Galimard, Archives d'Electricite Medicale, September* 10, 1906.) The reagent which they use is Freund's solution of iodoform in chloroform and the strength is 2 per cent. The quantity of iodine liberated affords a measure of the amount of X-ray applied. One unit I is the quantity of X-rays which, acting upon a 2 per cent solution of iodoform in chloroform with a volume incidence upon a surface of one square centimeter and a thickness of one centimetre, is capable of setting free one-tenth milligramme of iodine. Comparing these units with Bordier's chromoradiometer and with Holzknecht's system of units the following equivalents are found:

Bordier's Tints	Units I	Units H
I	3.5	5.
II	5.5	7.
III	10.	14.
IV	15.5	22.

Direct Measurement of the Quality of the Radiation from a Tube or Bonnette. (*Dr. Belot, Archives d'Electricite Medicale, August* 10, 1906.) The present sources of error are avoided by allowing the X-ray to shine through only one section of the Benoist radiochromometer at a time. This enables one to make a more exact comparison between the shadow cast by the silver and by the different thicknesses of aluminum. *S. T.*

On the Wrong and Right Use of Milk in Certain Diseases of the Skin. (*L. Duncan Bulkley, New York, The British Medical Journal, October* 6, 1906.) Milk is Nature's specially prepared food, containing all the elements necessary to nutrition, marvellously combined, upon which animals of many species depend during early life. Milk is also more or less used by man in adult life, both in sickness and health, and *a priori* should be a desirable form of nutriment, and should be of value at all times. But the experience of every one shows that the contrary is often the case, and one continually meets with those who affirm that they cannot take milk as it makes them "bilious."

The explanation of the observation that so perfectly prepared a food is not always properly assimilated by adults, when in childhood it forms such a precious element of diet, under almost all circumstances, is found probably in the changed character of the digestion and metabolic processes in the adult, which gradually lead up to gout, gravel, diabetes, tuberculosis, cancer and many degenerative changes belonging to adult life.

Some years ago a number of persons reported the successful intravenous injection of milk, not once but repeatedly, to the great benefit of depleted patients. In this process the milk enters the veins directly, mingles with the blood, and goes first to the lungs without previous digestion such as takes place in the alimentary canal; of this there can be no doubt, therefore ordinary digestion is not necessary for the assimilation of milk.

This observation led to the consideration of the possibility of introducing milk otherwise, in such a manner that it could reach the lungs first, without passing through the portal vein to the liver, where in adults it is so liable to excite the condition popularly known as "biliousness."

The chyle, formerly called "milk juice," and which is hardly distinguishable from milk under the microscope, is taken up by the lacteals, and discharged into the venous blood in the subclavian vein and vena cava, thence reaching the lungs. The question then arose if the milk, already in a state of perfect emulsion, could not pass through the same channels through which the elements of the chyle were absorbed without the process of coagulation, caseation, and subsequent gastro-intestinal digestion.

The problem, then, was to administer the milk at such a time and in such a manner that it would escape the acid and fermentative elements in the stomach during the process of digestion, and so avoid being curdled before it could be absorbed.

The stomach in health does not ordinarily secrete gastric juice except under the stimulus of food. At a varying period after the taking of food, the time being dependent upon the amount and quality of food taken, and the activity of digestion, the stomach has finished its task. Absorption of certain elements has taken place, other portions have been passed on to the intestines for further action, and the organ is found empty, awaiting cause for further activity. At this period the stomach loses its turgid color, becomes paler and quite flaccid, and its surface is bathed with more or less of an alkaline solution, forming what is known as the " alkaline tide." This accurs at varying periods of time after the ingestion of food, dependent upon many circumstances; it may begin an hour or so after the ingestion of a very small amount of digestible food, or it may be delayed four, five or even many more hours after a very heavy or unusually indigestible meal, or with very weak or sluggish digestion.

The idea is to give milk alone, pure or diluted with boiling water, at the body temperature, just after the alkaline tide has set in, or during its continuance, and to avoid food or any substance which could call forth gastric secretion until after its absorption has been fully accomplished. This plan is entirely opposed to the practice of eating a cracker with the milk, or even to the addition of an egg, whiskey, etc.

It repeatedly happens that the milk is taken too soon after a meal, while the stomach is still acid, and so the desired end is defeated. Or, when a long enough interval of time has elapsed, it has happened that, owing to a sluggish digestion, or to some especially indigestible article, the milk has come upon the products of a former meal, and not during the alkaline tide. Thus, patients will often take milk at half past ten or eleven in the morning, or at three or four in the afternoon, because at that time they had experienced a faint and " gone feeling," and mistook the uncomfortable sensation of delayed digestion for hunger.

Occasionally, if the digestion is sluggish, it will be necessary to administer pepsin or other digestives very freely and repeatedly in order to ensure an empty stomach early enough. If there is any doubt as to the alkalinity of the stomach, one or more full doses of bicarbonate of soda may be given half an hour or more before taking the milk; also a little soda may be put in the milk if there is any question as to its alkalinity.

The milk need not be taken longer than an hour before the coming meal, and occasionally it can be taken thirty minutes before.

It is a very common practice to order the milk taken while the patient is in bed, an hour before breakfast, and then to allow him to lie still for a quarter or a half an hour before dressing. In this way many who had previously begun the day tired, find themselves in a very different condition. The milk one hour before the noon and evening meal also proves most acceptable, and by taking off the fatigue of the day renders the meal less likely to disagree. When feasible it is well for the patient to lie down and rest half an hour after drinking the milk, taking a nap if possible. Milk is also often most serviceable taken later in the night, if the patient is wakeful or restless, provided no food or even medicine shall interfere with the exact operation of the plan recommended.

Milk, when taken successfully on this plan, not only does not interfere with the appetite for the following meal, but often increases it in a surprising manner. The process of secretion from the glands of the stomach and other organs depends largely upon osmosis and blood pressure. By the quick absorption of the milk the pressure in the capillaries is increased, and a richer blood is also offered for the production of gastric juice, while a certain amount of nervous relief is given, enabling a more adequate supply of nerve energy to the digestive organs.

It is common to meet with those with the most different affections of the skin who are positively harmed by milk taken in the ordinary way, and who experience the greatest benefit from a proper regulation of the habits in this particular. There are many others who have long avoided milk, because of its deleterious effects, who have gained in every way when this valuable addition has been made to their nutritive elements in the manner described.

It is especially in *acne* that the prejudicial effects of milk as ordinarily used may be seen. In many cases a muddy skin will indicate sluggish digestion and faulty metabolism, and the gain, after correcting the milk error, will be far greater than would be expected from the treatment employed.

Eczema also will often be found to be aggravated by the faulty use of milk, likewise *urticaria*, and indeed all eruptions with any element of a congestive or inflammatory character, and even *psoriasis* will do far better if this matter is attended to. Even in such a matter as excessive *loss of hair* there is generally a nutritive fault, which can often in a large measure be remedied by the addition of milk to the diet on the plan advocated, and frequently in severe or malignant *syphilis* the same is true.

After an experience with this use of milk for over twenty years, and with a most varied and most difficult class of patients to handle, and with some temporary failures, it may be asserted that when perfectly carried out, results can be obtained which are often marvellous; there is hardly a single fact in medicine or feature in therapeutics of which I am more confident.

Of course this method need not be confined to patients with diseases of the skin, and many physicians have given glowing accounts of its value in many conditions exhibiting depraved nutrition. G. E.

Notes on Purin-Free Diets. (*W. A. Potts, Birmingham, England, The Lancet, London, October* 6, 1906.) The purin bodies include all those constructed on the base C_5N_4. Some twelve different combinations of this kind are known to exist in nature, while a large number have been produced in the laboratory. Those of ordinary occurrence are uric acid, caffein, theobromin, xanthein, hypoxanthin, guanin, and adenin. These are found in meat and meat extracts, and especially in glandular organs, such as the pancreas and liver; they occur in smaller amount in many vegetables and in certain other articles of diet.

The mere fact that a diet is purin-free is of little value unless attention is paid to the other factors essential for healthy digestion. Thus the amount of food should be small, the meals few, and mastication efficient. At the same time the food should be plain. The tendency in some quarters to adopt a fruitarian diet and then spoil it by rich sauces and elaborate cooking, to say nothing of spices, pickles, vinegar and condiments, is only likely to breed disappointment and disgust. The man or woman who forswears meat and lives on highly flavored dishes, with cream and other rich accessories, would do much better on a plain mutton chop or a fish dinner.

If, however, simplicity is made the first essential, then much further benefit can be obtained by discarding all those articles of food and drink which contain uric acid and allied bodies in excess.

The fact that nearly all foods contain minute traces would seem to indicate that eliminating them altogether is a counsel of perfection we were not intended to contemplate. What we want to aim at is a reasonable minimum. The condition of "hyperpyræmia," due to an excess of carbohydrates, recently described as the underlying element in many disorders, is not developed on a properly arranged fruitarian diet; all excesses are bad and too much starchy food in conjunction with meat is especially injurious.

Excellent as are the results obtained in chronic mischief they bear no comparison with those that may be effected in acute illness. The progress of events is often startling to those who have had no previous experience of this system; the course run is benign, out of all proportion to the onset, supposing an ordinary diet to have been the previous habit. Many practitioners contend that fruit must be avoided in illness. Given with beef-tea and stimulants it does more harm than good, but if the beef-tea and stimulants are *entirely* discarded, the medicines reduced to a minimum, and all nourishment taken in the form of milk or fruit juice, results are obtained which can never be got by more orthodox treatment.

The diet for acute diseases is simplicity itself. In the first place we have milk, which may be diluted with soda water and given cold or warm; it should never be boiled, as in the process the antiscorbutic properties are destroyed and much of the albumen coagulated. An excellent plan is to give two ounces of milk regularly every two hours from the start. Should the taste pall, varying flavors may be imparted by such methods as heating the milk in the oven instead of a saucepan, or cooking slowly with rice and subsequent straining. The feeds of milk may alternate with, or be replaced by, fresh fruit juice, of which that from grapes or oranges is the best.

In cases where generous nourishment is required, the most valuable form is white of egg, which may be given beaten up with milk or water and sugar. Many invalids find nothing more refreshing and sustaining than egg lemonade, made by shaking up the juice of half a lemon and the white of an egg in a large bottle with half a pint of cold water, and adding sugar as required.

Treatment on these lines is not only successful in the first instance, but also obviates those after-consequences, such as acute "rheumatism," so frequently seen when stimulants and meat extracts are freely administered.

For chronic illness and ordinary life the simple diet recommended for acute diseases requires considerable extension on similar lines. The objection has been made that on the new system it is difficult, if not impossible, to take enough nourishment for robust health and active work. The researches of Chittenden and others into the amount of food necessary, and food values, have proved that the majority of people enjoy better health and can do more work after reducing the amount of their food by a third or a half. Just as meat possesses less nutritive value than is popularly supposed, so many articles in a fruitarian diet contain infinitely more.

Glandular organs, such as sweetbreads and liver, must be entirely avoided. The least injurious of meats is mutton, and of fish is cod. Coffee must be given up, and only weak China tea may be sparingly used.

The best fruits for food are apples, bananas, grapes, nuts, dates, raisins and figs. Nuts are especially valuable owing to the large amount of fat they contain, but they require thorough mastication. Chestnuts are the easiest to digest and make an excellent food. Stone fruits sometimes disagree and acid fruits should be taken in moderation. Strawberries contain a considerable amount of purin, and should be avoided by all with a gouty or rheumatic tendency. Among fruits should be included those of the cereals such as wheat and rice. White bread is free from purin, but brown contains a varying amount derived from the husk. The most wholesome form is unleavened.

Vegetables are less useful articles of diet. Many contain but little nourishment and others, such as peas, beans, spinach, asparagus and onions, contain noticeable amounts of uric acid. It must be understood, however, that the purins derived from the vegetable kingdom act less injuriously than those from an animal source; the latter are always combined with ptomaines, for recent experiments have proved that meat, even when freshly killed and immediately placed upon ice, always contains such products of decomposition. Potatoes are among the best of the vegetables under ordinary circumstances.

Vinegar is a prolific cause of dyspepsia, and should never be taken by those who aim at robust health. As an alternative an excellent salad dressing is made by a little pure olive oil with a squeeze of lemon juice.

Another article of diet free from purins is cheese. Its nutritive value is high, but care must always be taken not to indulge to excess in such a concentrated food. Milk and uncooked white of egg has already been rcommended. The yelk of egg is probably not free from purin, and is not easy of digestion. Honey contains a considerable amount of nourishment. Oatmeal contains more than a trace of purin, and must therefore be taken in moderation, for it would be a pity to entirely exclude from the diet such an inexpensive, palatable and sustaining article of diet. Mushrooms are not only charged with the offending ingredient, but in addition are difficult to digest.

The splendid appearance and physique of those brought up on this system are in marked contrast to the anæmia and malnutrition so common among meat-eaters. G. E.

The Dietetics of Obesity. (*Alfred C. Croftan, Chicago, The Journal of the American Medical Association, September* 15, 1906.) The reduction of obesity is an important therapeutic task, when regarded as a necessary step toward removing adipose tissue which is producing disagreeable or dangerous complications about important organs, notably the heart and arteries, the bronchi, the digestive apparatus and the nervous system.

The methods at our disposal for reducing obesity are chiefly dietetic. Second in importance is the regulation of the muscular exercise. These two means, singly or combined, usually suffice to accomplish the desired result.

It is convenient to distinguish three degrees of obesity. Each requires particular treatment.

In the first form no attempt need be made to reduce the amount of fat, but every effort should be put forward to prevent its further development, particularly if premonitory signs of complications about the thoracic or abdominal organs begin to make their appearance.

In the second and third forms it becomes necessary to institute more or less energetic restrictions, with the object in view of causing a loss of fat.

Broadly speaking, carbohydrates and fat foods should be reduced and not the albumins. The reduction of the albumin below certain normal average requirements is a dangerous and precarious procedure, whereas the fats and carbohydrates can be considerably reduced without much detriment to the individual.

The diet should be so arranged that the calories furnished in the food should be equal to the number calculated for a person of equal height with the patient but of the average weight for that height, and not for one of his abnormal bulk.

A patient, forty years old, of a height of 1.68 meters (five feet and six inches), and of a weight of 63.7 kilogrammes (one hunderd and forty pounds), may be assumed to normally require food representing 2230 calories a day.

If the patient does not lose weight on such a diet, containing the full normal caloric requirement, then it is necessary to reduce the caloric intake still further. It is convenient to arrange three degrees of reduction cures. In the first the caloric requirements are reduced to four-fifths of the normal, in the second to three-fifths, and in the third to two-fifths. The popular cures of Banting, Oertel, Epstein, Hirschfeldt and others are cures of the third degree, and are usually far more severe than is safe or necessary.

In the first degree the loss is usually very slow, rarely more than two or three pounds a month, even when aided by considerable physical exercise. It is chiefly useful in preventing the further increase of fat in subjects who show a tendence to obesity. It is eminently suitable for continued use, and does not require great sacrifice on the part of the patient. One should allow meat only once a day, reduce the amount of fat and starchy and sweet foods somewhat, restrict or forbid alcoholic beverages, give " filling " foods of small caloric value in abundance, restrict the liquid intake to one or one and a quarter liters of fluid a day, and order abundant physical exercise.

The second degree is also useful for continued use. It should be adopted (1) for very strong and very fat subjects, who want to get rid of surplus fat, and who can safely indulge in very active physical exercise; (2) for those who are not only fat, but in whom complicating disorders about the heart, arteries, bronchi or digestive organs render it impossible to work off fat by exercise, so that the necessary reduction must be brought about at first by dietetic restrictions; (3) for strong fat individuals who cannot at once tolerate a third-degree reduction cure without developing alarming symptoms of weakness, particularly about the circulatory and muscular apparatus. This second degree leads to slight and slow losses of fat, rarely more than from six to ten pounds a month.

The third degree is a rapid reduction cure. It is best carried out in an institution. Combined with systematic exercise and drink restriction as much as thirty pounds a month can be lost with safety. This cure should never be carried out for indefinite periods, and six weeks is the longest time during which this serious restriction of the patient's nourishment should be allowed. This degree may be alternated with the second degree, using each for alternating periods of from four to six weeks.

The rapid reduction cures, such as the Banting system, which are so popular among the laity, are rarely without danger to important organs, nor are the results usually permanent. In the very young and the very old rapid reduction cures should be altogether eschewed.

The albumin content of the body must never be attacked, hence less than the minimum necessary to maintain adequate nutrition must never be given. This minimum lies between 60 and 80 grams a day, which corresponds to between 400 and 600 grams of lean meat, which should therefore be invariably supplied. Excessive meat feeding is unnecessary.

Altough fat does not form fat in the body more than the carbohydrates, practically it is better to reduce the fats, and to give relatively large quantities of such carbohydrate foods as possess bulk, for the latter as a rule have a small caloric value, while they satisfy the patient.

The best plan is to give three meals a day, and two or three small meals between, the latter consisting of articles like bouillon, coffee or a little fruit, that all possess a small caloric value. They help to keep the patient comfortable, avoiding disagreeable sensations of weakness and gastric emptiness, and at the same time preventing him from becoming too ravenously hungry at meal times and consequently overeating.

The total liquid intake should be reduced to from 1 to 1 1-2 liters in the 24 hours. A reduction to the minimum rapidly reduces the weight, especially during the first four or five days. The reduction is not permanent if the patient increases the water drinking. It is due in part to a direct loss of water from the tissues, and in part to the fact that one drinking very little water does not eat as much as one taking a normal amount of liquid.

Alcohol may be allowed, if the caloric value of each gram is taken into account.

Of meats that which is lean is preferable. It contains 20 per cent of albumin and 1.5 to 2.0 per cent of fat, so that 100 grams of lean meat, weighed raw, furnish about one hundred calories. It should be prepared in a simple way, either stewed, roasted or broiled. All meats prepared by frying or served as ragouts or with bread crumbs, sauces and gravies should be avoided.

An obese subject may eat small quantities of caviar, sardines, boiled lobster, crab meat, oysters (120 grams, equal to 14 to 18 oysters of medium size, contain 100 calories) and pate de foie gras.

Cheese serves a useful purpose, for, even in small quantities, it is very filling. Twenty-five grams furnish about one hundred calories.

Milk is useful, if its caloric value and the water it contains are included in the calculation. One hundred c. c. of milk furnish about sixty calories, and a whole quart of buttermilk about two hundred and fifty calories.

Thin soups, bouillon and beef-tea are exceedingly useful. They are filling, and agreeable to the taste.

Potatoes are permitted in small quantities, either baked, boiled or mashed.

Other vegetables which grow underground or in pods should be forbidden or restricted. All other vegetables are useful. They should be boiled in salt water, and served without the addition of cream, butter, flour, etc.

Fruits, except bananas, sweet grapes, figs, dates, raisins, are permitted freely. About one hundred calories are contained in 220 to 250 grams of fruit.

The use of bread should be much restricted. Those varieties made of vegetable albumin (gluten breads, aleuronat bread, etc.) are particularly useful, if they are baked so as to become fluffy and voluminous.

A great many mineral waters enjoy deserved popularity in the treatment of obesity, notably those of Kissengen, Vichy, Homburg, Carlsbad and Marienbad. It is futile to attempt reduction by these waters alone. The indiscriminate use of mineral waters is to be condemned. The effects attributed to these waters, taken at the resorts, is due only in small part to the particular water used, and in much greater part to the careful and strict regulations in regard to exercise, general mode of life and diet that the patients undergo much more willingly and conscientiously at a watering place than at home. Fully as useful, probably safer, and by all means cheaper is the treatment of obesity in an institution where a like control can be exercised over the patient's diet and habits.

G. E.

HYDROTHERAPY

Hepatic Douches. (*Drs. Raymond and Duchesne, Journal de Physiotherapie, July* 15, 1906.) Up to the present time, hepatic douches seem to have been restricted to Fleury's technic: a strong jet is directed over the liver area during from ten seconds to one minute. This is preceded by a rapid general high pressure application of cold water and followed by a shower on the epigastrium and warm water on the feet. According to the writers, most patients do not tolerate such a treatment and it proves frequently harmful. Hepatic douches yield excellent results in hepatic congestion, hypertrophy, and biliary stasis. Cold water applications are very powerful, but sometimes too severe; and warm water (100 degrees to 113 degrees F.) is preferable to begin with. The following technic is the best: begin with 100 or 102 degrees F., raise progressively to 113 degrees F., at the same time increasing the strength of the jet. Keep at 113 degrees till the skin becomes dark red (one-half to one minute) and then give a general cold or lukewarm douche. Hepatic congestion, malaria, alcoholism, dyspepsia, diseases of the nutrition are the chief indications. Chronic jaundice, lithiasis are greatly benefited in all cases.

F. E. G.

The Nauheim Bath in Gynecology. (*Samuel Wyllis Bandler, The Post-Graduate, September,* 1906.) The Nauheim bath as given by Bandler " consists of a tub full of water, containing sea-salt, calcium-chloride and carbonic acid gas in varying proportions. The various springs at Nauheim contain these elements in different proportions. The baths are taken at a temperature varying from 95 to 80 degrees Fahrenheit. The duration of the baths varies from eight to twenty minutes. . . . A full bath of water at a temperature less than that of the body, exerts first, a stimulating action on the central nervous system and upon the trophic centres. If, at the same time, it withdraws heat from the body it increases the process of oxidation. A bath of fresh water may be given with benefit or comfort at any temperature which does not produce too great a shock, if it is followed by a normal reaction or by mechanical rubbing which produces a reaction. Such a reaction results in a change in blood distribution, relieving the interior of the body of congestion, increasing the number of red cells in the circulating blood, increasing the tone of the heart, the vessels and the tissues, and causing increased tissue metabolism, particularly through the stimulus given to the trophic central nervous system. Baths of a temperature less than that ordinarily borne with comfort may be made not only comfortable but still more valuable by the addition of chemical substances which exert a chemical stimulation upon the skin and the peripheral nerves.

The addition of salt is one of the means of accomplishing this purpose. If five to ten pounds of salt be added to a full bath, such a bath can be taken at a lower temperature because of the chemical stimulation of the salt. An added advantage is the increased oxidation produced by the addition of the sodium-chloride, chemical tests having shown that oxidation is increased by this means. Zuntz found that in a three per cent saline bath there was an increase of oxidation, as compared with a fresh water bath, so that fifteen per cent more oxygen was used and twenty-five per cent more CO_2 was given off. If to a bath containing salt, calcium-chloride, in amounts varying from two to ten ounces, be added, the baths can be taken at a still lower temperature, because the calcium-chloride by its peripheral chemical stimulation aids in the production of a reaction and brings the circulating blood still more actively to the surface of the body. Further chemical tests have shown that the addition of calcium-chloride to a bath has a marked action in increasing tissue metabolism, and that this action is exerted specifically in the breaking down of old tissues, such as the end results of various inflammations, and likewise such as are included under rheumatic and gouty deposits.

The addition of carbonic gas is a most important factor, for it stimulates the peripheral nervous system, causing a dilatation of the peripheral capillaries and bringing the blood still more readily to the surface of the body, thus relieving congested areas and taking a strain off the cardiac muscle. A further and most important action of the carbonic acid gas is that to which Graupner has called attention, viz., its reflex action upon the central nervous system, stimulating the various transmission fibres, and the trophic centres in the spinal cord. Some of the results of the Nauheim baths include:

(1) A slowing of the pulse rate.

(2) An increased excretion of urine.

(3) Increased oxidation.

(4) Increased metabolism and a breaking down of old tissues.

(5) A regulation of the circulation and an even distribution of the blood through the various structures of the body.

(6) Increased demand for nutrition.

(7) Building up of healthy tissue.

(8) Resorption of exudates.

(9) The relief of congestions.

(10) Stimulation of the nervous system and the trophic centres.

The author defines the class of cases in which these baths are helpful as follows:

" (1) The baths are of value in certain cases of insufficient development of the genitalia associated with relative amenorrhea and with dysmenorrhea, especially if complicated by chlorotic symptoms. The giving of iron and arsenic, as well as ovarin, is an added therapeutic measure of very great potency.

" (2) Uterine conditions associated with a lack of tonicity of the muscular and vascular structures, such as are found, for instance, with uterine catarrhs. The immediate effect can be recognized by the large amount of mucus discharged after a bath, which result is produced by the increased circulation and increased stimulation to contraction on the part of the uterus. Therefore, the baths are of great value in cases of subinvolution, and in persistent hyperemia with or without an inflammatory etiology.

" (3) Cases of inflammatory metritis and subinvolution fibrosis may be benefited so long as no great interstitial hypertrophy has taken place. In fact, cases of chronic induration of the uterine muscle, especially such as are associated during the climacterium with marked bleedings, should be treated with care, since an increased blood supply is liable to produce exacerbations of hemorrhage.

" (4) A large number of cases of sterility are due to a latent, very subacute, salpingitis, sometimes with and often without closure of the abdominal end of the tube by cobweb peritoneal adhesions. Such instances due to gonococci, in which the inflammation has followed the course of the mucus membrane from the cervix up, are to be distinguished from septic cases due to streptococci or staphylococci and from tubercular cases in which the peritoneal inflammation is primary, and the infection of the tube secondary. We know that cases of salpingitis of the former class, in which the abdominal ends are not absolutely closed, are cases which may be cured. That adhesions may be prevented and the organization of adhesions may be avoided by these baths, I believe to be well grounded theoretically, and to be proven practically. The Nauheim bath by promoting a normal pelvic circulation, by relieving congestion, by toning up the system generally, can cure such cases of salpingitis, and pregnancy may result. The attainment of this desired end is aided by very conservative vaginal treatment of the cervix, of cervical catarrh and of cervical erosions. Great stress is to be laid on the avoidance of intracervical and especially intrauterine treatment of any sort.

" (5) A very beneficial action is exerted by the baths in cases of inflammation of the pelvic connective tissue. Cases of cellulitis in early stages, particularly such as occur after labor or abortion, are very much benefited by the administration of the baths. If the baths are given after the pelvic connective tissue is contracted and sclerosed, the benefit is much less marked. In all inflammatory conditions, if the temperature has been reduced to the normal, with or without operative measures, the increased blood supply and the relief of congestion aid the resistance of the patient in overcoming the remaining inflammatory elements, and tend to restoration to the normal with a minimum amount of injury.

" (6) An almost specific action of the baths is to be found in those cases of local pelvic subinvolution and in cases of general subinvolution so frequently associated with gastroenteroptosis and movable kidney. These conditions are most frequently found in women who have borne children, but occasionally in certain women characterized by a general inelasticity who have not borne children. The baths increase the tonicity of the various ligaments related to these pelvic and abdominal ptoses. The baths produce an exhilaration temporarily and an increase in strength permanently.

" Such cases, called hysteroptosis, are decidedly benefited. The patients gain in strength and weight, the number of red blood cells is greatly increased, appetite improves and a feeling of strength and exhilaration results, such as no treatment can accomplish in the same time. In addition, the local symptoms and, what is more important, the idea that a diseased local state exists, disappear. Here, too, the addition of iron, arsenic and ovarin is a valuable therapeutic adjunct.

" (7) There are numerous cases in whom it is desirable before operation to restore to the normal the circulation in the pelvis and to reduce to the greatest possible degree the amount of accessory exudation. I refer to cases of pyosalpinx, and especially to cases of salpingitis. Here a course of baths given before the operation aids permanent convalescence of the patient and has a tendency to prevent the occurrence of further adhesions. In other cases a course of baths administered after the operation furthers the convalescence and aids in the resorption of those stump exudates, which so frequently mar the permanent valuable results of the operative procedure.

" (8) An unrecognized but most valuable field for the administration of the baths is found in the postpartum treatment of women. In my own practice, so soon as mothers are able to walk about, at some period in the third week, a course of these baths is given to aid the involution of the pelvic organs, to assist in the restoration of pelvic and general tonicity, to stimulate the nervous system and to aid the secretory function of the breasts. I am sure that with this aid patients suffer less from loose abdominal walls, acquired displacements of the uterus, hysteroptosis and physical and mental asthenia. I find that the patients at the end of five or six weeks are almost restored to their normal previous condition of elasticity and well-being.

" (9) Certain cases of obesity, and especially such as are accompanied by a diminution in their regular menstrual flow, are benefited by a course of these baths. Not infrequently the patients lose weight, especially on a diet rich in nitrogenous elements and poor in the starchy components. Here, again, the addition of iron, arsenic and ovarin, aids in the desired result.

" (10) A further and most valuable field for the use of the baths is to be found in the climacteric period. Here the nervous accompaniments of the " change of life " are often a source of annoyance and misery to the patient and her family. In those cases not complicated by climacteric hemorrhages, I am most enthusiastic about the results to be gained by a course of Nauheim baths. The asthenic physical condition, the mental depression, the irritability, the nervousness, and especially the sleeplessness, are certainly relieved to a great extent by a judicious use of these carbonated saline baths. If, with the baths, a thorough course of massage is given, and if at the same time ovarin is administered with or without iron and arsenic, the results in many instances are nothing short of astounding.

" (11) Though not strictly in the field of gynecology, I must again mention the valuable action of the Nauheim bath in many cases of rheumatism and gout. Many gynecological patients suffer from such states, and have gouty or rheumatic nodules in various parts of the body, causing severe pain in various nerves, and causing attacks of marked occipital headache and pain along the vertebra, often associated with mild or severe attacks of migraine or pseudo-migraine. Here, Nauheim baths plus massage of the nodules are often productive of marked relief from the annoyances of this diathesis."

The method of procedure is described as follows:

" Baths when begun contain three to five pounds of sea-salt, two to four ounces of calcium chloride and one-half box of Triton salts. In sensitive cases the Triton salts, which furnish the carbonic acid gas, are omitted from the first few baths. The water is of a temperature of 95 degrees F.; the duration of the bath is eight minutes. The patient lies quietly in the bath. At the expiration of the stated time the body is dried gently, preferably with warm towels, and the patient then lies down in bed for one hour, first taking a cup of hot milk or weak tea. At the expiration of this hour the patient can resume her daily vocation, being careful to avoid great exertion of any sort. Baths are best taken in the morning, at least two hours after the meal. The baths are taken three days in succession, then comes an interval day on which no bath is taken, then three baths more are taken, then comes another interval day, and so on until about twenty baths have been administered. No baths, of course, are given during menstruation. Each set of three baths is made a little stronger by the addition of a little more salt, a little more calcium chloride and more of the Triton salts, but only if patients stand the baths well. The last three to six baths contain eight to ten pounds of sea-salt, eight to ten ounces of calcium chloride, one box and a half of Triton salts. The temperature by this time has been reduced to 85 degrees and in some instances to 80 degrees. The lowering of the temperature depends upon the manner in which the patient bears the change in temperature. No patient should leave the bath feeling cold or chilly. The last baths should have a duration of 18 to 20 minutes. The beneficial effects of these baths are very much enhanced by a subsequent change of air for from two to four weeks at an altitude of 1000 to 2000 feet. In almost all cases, and especially in cardiac cases, the administration of digitalis after a course of baths produces extremely beneficial tonic effect."

He recommends a modification of the general Nauheim baths for cases in which it is desired to secure a purely pelvic effect such as mild subacute pelvic inflammations, which consists of sitz baths containing enough water to cover the pelvis up to the umbilicus when the patient is in the sitting position. This bath should contain from three to five pounds of sea-salt and from three to six ounces of calcium chloride and should be applied at a temperature of from 95 down to 85 degrees F, lasting for from ten to twenty minutes. This procedure is usually followed by an improvement in the pelvic circulation and relief of congestion and the slighter degrees of pain.

MECHANOTHERAPY

The Therapeutic Value of Artificial Localized Hyperemia in the Treatment of Ambulatory or Dispensary Cases. (*Edwin Bier*, *Medical Record*, *August* 25, 1906.) A study of inflammatory diseases caused Bier to come to the conclusion that hyperemia was nature's most efficient weapon for com bating disease, and that the antiphlogistic method of treatment generally employed interfered with nature's efforts to effect a cure and was radically wrong. Acting upon this conclusion he decided that in order to assist nature in overcoming inflammatory disease processes her phenomena must be imitated instead of opposed.

There are two kinds of hyperemia, (1) active or arterial, and (2) passive, congestive or venous. In producing the former Bier employs heated air. But the author has not used this method at all in his cases, although he considers it an efficient therapeutic agent. In the production of the venous hyperemia the author has used the same method recommended by Bier, that is, the employment of suction, and constriction of the venous circulation above the lesion.

The instrument employed consists of a glass vessel and some means of rarefying the air within the same. Bier has had a large assortment of cups made of different shapes and sizes so that they may readily be adjusted to different surfaces of the body. Rarefication of the air is effected by the use of a rubber bulb whereby the air is pumped out of the interior of the vessel; in other words, simply dry cups. There have also been constructed large suction apparatuses so made as to surround large parts of the extremities, for instance, the whole hand, arm, knee joint, etc. These apparatuses should be made so that they can be boiled or rendered aseptic in some way in order that one patient may not be infected from another.

In the application of these cups two facts should be borne in mind, (1) the procedure should not be allowed to cause pain, and (2) the suction should be intermittent. The suction should be as strong, however, as the patient can bear without the production of pain and the cup is allowed to remain in place three or four minutes, then removed for one or two minutes, which process is kept up for from thirty to forty minutes. The frequency of application will, of course, be governed by the condition and varies from two or three times a day to once every other day. Bier considers that the more frequent application is more beneficial.

The author reports twenty-six cases of infected wounds and cellulitis of the fingers or hand, thirty-five cases of abscesses, furuncles and carbuncles, six cases of suppurative adenitis, seven cases of acute bursitis and two cases of contusion of the eye (black eye). The effect in all these was to produce recovery in very much shorter time than under ordinary methods of treatment, and in most cases to effect immediate relief of pain. He has also used it in six cases of sinuses of soft parts and bones, producing unusually rapid closure and recovery.

The method of producing venous congestion that has attracted most attention is that by constriction, and for this only a rubber bandage is necessary. This is applied just above the lesion to be treated, and enough tension is employed to produce a marked degree of venous engorgement but the pulse in the arteries should never be obliterated and pain should not be produced. The more profound degrees of tension can only be borne with comfort for about an hour, but a milder degree can be borne for the greater part of a day. In all degrees of tension the parts become edematous because of the interference with the return of the circulation, but in the lesser degrees of constriction where the bandage is worn for a longer time the swelling is more marked. After removal of the bandage a reactive arterial hyperemia sets in, such as is seen after the removal of tourniquet.

These two degrees of congestion have separate and different fields of action. The more marked degree is particularly valuable in chronic conditions, whereas the milder degree is especially useful in acute conditions. As stated above, the first method involves leaving the bandage in place at the longest for one hour, but the second demands that the bandage be kept in place for the greater part of the day and night, but shifted, if possible, every ten hours to a new position to avoid excessive localized pressure. It should be removed for three or four hours after twenty hours' action before it is reapplied. Bier has employed the constriction method of producing hyperemia in six cases of bone and joint tuberculosis and has been much pleased with his results.

The author states that a verdict as to whether the constriction method or the dry hot air method of producing hyperemia is the better cannot at present be rendered, but he considers that the induction of hyperemia is a most important therapeutic method and destined to occupy a prominent place in the future treatment of disease.

The Value of the Bier Treatment. (*Edward Adams*, *New York Medical Journal*, *August* 18, 1906.) Adams states that the Bier method of treatment, which consists of damming back the venous circulation by constricting the vessels above the focus of disease, is of great value if properly used, especially in connection with acute surgical affections of the soft parts. He has applied it with gratifying results in gonorrhœal infection of the joints, traumatic and tuberculous synovitis; also in one case of inflammation of the right ankle-joint accompanied by swelling, severe pain and stiffness which had been unsuccessfully treated for rheumatism (?) for eleven weeks. This last-mentioned patient was able to walk about all day and the pain and stiffness had entirely disappeared after twenty-two days of treatment.

Adams very justly remarks that the technique is of the utmost importance in the use of Bier's constriction and gives the details as follows:

"In order to produce this damming or passive hyperæmia it is best to use an ordinary Esmarch or Martin thin pliant rubber bandage, about two inches in width. If such a bandage is applied moderately tight in several layers, not necessarily directly over each other, around a limb, and it matters not whether an elbow or ankle-joint is the diseased part, it will soon be noticed that the subcutaneous veins swell, the skin becomes of a red hue, which is slightly tinged blue; the limb becomes larger and œdematous and gives a feeling of warmth to the touch. If there is pain it ceases almost immediately, and the stiffness in the joint gradually becomes less. The rubber bandage in this case should not cause any uncomfortable feeling, and this degree of hyperæmia (the so-called heisse Stauung) or hot damming, is the only right and proper one that can be used as a remedy. Sometimes it is very difficult to obtain this degree of hyperæmia, and it requires careful attention and some practice to apply the bandage in such a way that the arteries are not compressed, while at the same time the veins are so far compressed as to partly check the reflux of blood, so that the flow of blood is retarded while the circulation is not entirely suspended.

"In applying this treatment to a knee or elbow-joint I find that sometimes it is easier to obtain the right degree of hyperæmia by bandaging the distal part of the joint with a flannel bandage. Other aids can be used to produce the proper degree of hyperæmia. Sometimes a heavy coating of tincture of iodine over the diseased joint causes a slight inflammation; then the bandage applied over the affected part causes a very good hyperæmia. Again, one can make the limb bloodless for a few moments by Esmarch's method, and after waiting for the reactive hyperæmia, then dam with the bandage the copious amount of blood from the reactive hyperæmia.

In order to prevent any unpleasant results, such as atrophy of the muscles or irritation of the skin at the place where the bandage is applied, a few layers of gauze can be interposed between the skin and the rubber. It is also advisable to change the place of the bandage; for instance, to put it at night directly above the diseased joint, and during the day quite far away from the joint. If the bandage is too tight the skin of the limb looks grayish blue, and there appear whitish or vermilion colored spots, which grow larger and larger so long as the too tightly drawn bandage remains on. The joint is cold to the touch (the so-called kalte Stauung, or cold damming). Even where there is a subjective feeling of warmth, there also appear paræthesia and pain under these conditions. All the phenomena indicate that the bandage is too tight and must be loosened.

" At first the bandage can only be worn for half an hour in the morning and half an hour in the afternoon, and the length of time can be increased daily. One patient I have in mind wore it for over eighteen hours without any unpleasant effects. The hot damming previously described can only be used as a therapeutical measure, and at the first application of the bandage the patient must be strictly admonished to tell at once if more pain is felt, if the joint becomes blue or feels cold or numb. After the removal of the bandage it is well to massage the part and to exercise the joint."

PSYCHOTHERAPY

The Induction of Hypnosis. (*Edwin Ash, London Lancet, August* 25, 1906.) Hypnosis depends more on the wish of the subject than on the " will " of the operator. The matter of chief importance is to get the subject to fix his attention and to inhibit the natural stream of thought. If the fixation of the attention is great enough, or the subject's natural power of inhibition is strong enough, a condition resembling sleep ensues. Thus there are two phases of hypnosis, one in which the fixation of attention is incomplete, so that the subject, although amenable to suggestion, is yet perfectly conscious of his surroundings, the other in which the inhibition of thought is so complete that he loses touch with his surroundings and is to all intents and purposes asleep. To say that one has inhibited the " supraliminal consciousness " or " objective mind " and unmasked the " subliminal consciousness " or " subjective mind " is really only another way of expressing the above process. It obviously requires no particular inherent property or power to help a person to fix his attention so as to stop his train of thought — a process which may be to great extent mechanical and consequently will require some adroitness of method. So that anybody who has tried various methods of bringing about this desired object and has studied the best means of distracting a subject's attention from his surroundings and " fixing it," and has carefully observed the conditions that predispose to success, will be more readily able to induce hypnosis than another who tried at hazard to use a method he has read about but of which he has no technical knowledge. It stands to reason that the conditions that will readily fix one person's attention will perhaps disturb another person to such an extent that he will think faster than ever, instead of lapsing into a state of mental calm.

It should be clearly understood then that an expert hypnotist is not a person endowed with some mysterious power, but somebody who has taken the trouble to study carefully the psychology of his subjects, with the object of ascertaining what means are likely to succeed best in bringing about in them a state of mental rest, suiting his methods to every individual case. Psychologists define " Attention " as mental activity which raises certain sensations or ideas in point of intensity and completeness, with a corresponding lowering of simultaneously presented impressions—a process familiar to everybody in daily life. How many people habitually close their eyes when they wish to appreciate music fully, striving to subordinate all impressions to that of sound, the appreciation of which then rises in intensity above that of the rest. Similarly a surgeon will often fix his eyes on some distant object so as to let nothing distract attention from his tactile sense which is at that moment engaged in giving an impression of some intra-abdominal disorder. *In this fixation of attention we have, the author is convinced, the key to the problems of hypnosis.* The attention is fixed on some point—for example, a bright disc—and is then readily transferred to the ideas and sensations suggested by the experimenter.

Let us now examine the readiest means of so fixing a person's attention as to induce hypnosis and consider the experimental phenomena that can be demonstrated in that condition. As a matter of fact, to anybody who has not had previous experience of hypnotic experiments and is anxious to induce hypnosis the subject is at first of greater importance than the method. There are a large number of people who are readily able to " stop thinking " and to fix their attention at will. Such people are usually in the best of health, unaccustomed to worry over trifles, and do not know what it is to have disturbed sleep or difficulty in getting to sleep. They are " susceptible to hypnosis" and may be found most frequently as one would suppose, in the healthy working male population between the ages of 15 and 30 years. The experimenter, therefore, should find such a subject and explain to him the nature of the proposed experiments. On no account begin with people in feeble health or who are " neurotic "; males being preferable to females. And having made himself familiar with the described phenomena of hypnosis he should decide which of these he wishes to obtain in the first experiment. This is where so many fail.

Hypnosis may be very roughly divided into three stages, namely—1. A condition of drowsiness and inability to open the eyes when forbidden to do so. 2. A dream-state in which various ideas suggested appear to the subject as if in a dream or picture. In both these stages the subject is quite aware of his surroundings and that he is being made the centre of an experiment. He feels lethargic and disinclined to move and that he cannot move his eyelids or limbs when told not to do so by the operator. 3. In the third stage the attention has been so completely distracted from present surroundings that the subject has fallen into a condition of sleep. In this state he is peculiarly amenable to suggestion, will talk when spoken to, and will describe various hallucinatory scenes that are suggested to him; and may walk about and take active part in these imaginary scenes. This is what is described as *Somnambulism* and is a condition in which an infinite variety of hallucinations may be suggested—visual, auditory, and æsthetic. When complete the subject has no subsequent recollection of his hallucinations.

A characteristic condition that can usually be produced in almost any stage is that of catalepsy; if the subject's attention be directed to any limb and it is suggested that the limb is becoming stiff an extraordinary rigidity will result, of variable duration, and for the time being quite preventing any voluntary movement of the limb affected.

Now it should be obvious that it is too much to expect that the beginner in his first experiment will succeed in producing the deeper stages of hypnosis. He must be satisfied if after many attempts he succeeds in preventing the subject opening his eyes when told he cannot do so. Experience shows that some really susceptible subjects are not much influenced at the first sitting. The novelty of the experiment and the unusual requests made as to behaviour tend to produce at first a state of unrest rather than of calm. However, people very soon get accustomed to the process and the deeper stages can often be obtained at the third or fourth sitting. It is best to follow out a scheme in the experiments such as the following, which was arranged by the author for the benefit of practitioners who ask for instructions in the technique of hypnosis.

Instructions for inducing hypnosis. Carry out a series of eight experiments each of which will undoubtedly consist of several attempts to obtain certain phenomena; these should be repeated until the required result has been obtained. The experiments are: (1) to get used to the necessary details as to surroundings and technique of the process, and, further, then to attempt the production of stiffness or immobility in the subject's eyelids; (2) to induce hypnosis by a modification of Braid's method of fixed gazing; (3) production of the intermediate dream-state; (4) to obtain passive somnambulism; (5) to change this passive state into a condition of active somnambulism (N. B., these experiments include the investigation of altered sensibility, analgesia and anæsthesia) and the production of catalepsy; (6) demonstration of post-hypnotic influence; (7) hypotaxy or fascination; and (8) hypnosis by passes. Space will not permit me to enter into a more detailed description.

W. B. N.

CLIMATOTHERAPY

The Open-Air Treatment of Pneumonia. (*W. P. Northrup, Journal of the American Medical Association, October* 13, 1906.) For more than eleven years Northrup has been treating pneumonia patients in cool, fresh air, gradually placing their beds nearer and nearer the open window. Last winter in the children's service at the Presbyterian Hospital he put them out on the roof. His systematic practice was to put all pneumonia patients during the day for six hours on the roof in the open air in all weather in which harsh, high winds, rain and snow did not prohibit. Indeed the patients were not always brought in for little sprinkling rains or trivial snow-falls, and many times were out when high snow formed a corral about the space in which the beds were grouped. A permanent wind-break formed by the sun-room on the west and a built-up screen on the north protected them somewhat. Much of the time, however, the wind was in the south, and more often in the east. In this case a very inefficient canvas awning partially screened the patients, until one night in December high winds wrecked the contrivance,

Northrup would not underestimate the use of drugs in infantile pneumonia, but he wishes to emphasize the therapeutic value of hygienic measures, especially water and fresh air. In his opinion the two most important aids are " plenty of water inside and outside and fresh air everywhere." Illustrative histories of cases are then presented by the author showing the beneficial effects of his method. In summarizing he states that no cases have been injured and a few have been much aided, possibly saved, by the cold, fresh-air treatment. The only strict regulation is to make the patients comfortable, keeping their feet warm especially. The ears, nose and hands may get cold without harm.

Northrup has also tried this treatment in other infectious diseases, including typhoid with severe bronchitis, and whooping cough with bronchitis and convulsions, with excellent results. It seems to him to be the ideal treatment in all forms of "septic" fever.

The authorities of the Presbyterian Hospital are so convinced of the permanent usefulness of the open-air treatment for all infectious diseases that they have already built a roof-garden for the children's ward and are about to construct on the main roof of the medical side of the hospital a second garden of colossal proportions. One-half of this has a "horse-shed" structure, the shed open to the south, and a liberal space in front is enclosed, like a paddock, for a roof-garden. In bad weather the beds of the fever patients are to be wheeled back into the depths of the shed. In good weather they will be advanced more and more to the opening or even out into the garden. They will remain there, night and day, so long as their fever is high. It is to be an open-air ward. *J. K. C.*

A Practical View of Tent Life in the Southwest. (*E. E. Elliott, New York Medical Journal, October* 6, 1906.) Where in the great southwest should a tuberculous patient be sent to obtain the best results? Where will he find open air tent-life most satisfactory? What instructions should he receive to insure the quickest benefit? These questions, says the writer, are asked oftener than they are answered. He has himself from necessity lived for several years in a number of localities in the west and southwest which are popularly regarded as beneficial for consumptive patients, and has met many hundreds of sufferers in every condition, from the so-called incipient stage to the hopelessly incurable.

Many instances have come within the writer's observation where lives might have been saved had proper, detailed instructions been given in advance in the patient's home town. For instance, patients with weak hearts and diseased lungs trying to get well in great altitudes where even very slight muscular effort causes suffering, in cold, windy sections in winter time instead of in those of quiet warm sunshine. Men used to steam-heated rooms advised to live in tents where the temperature was often below the freezing point. The usual result is a rise in the body temperature, pneumonia, or a further extension of the tubercular process.

Information regarding particular localities is reliable only when obtained from disinterested persons. Few physicians have the time or opportunity to make personal investigations. Unprejudiced facts regarding different locations having widely different climatic conditions should be available for every medical practitioner. The writer endeavors to supply us with useful hints regarding certain southwestern localities.

It is not generally understood that within the boundaries of Arizona and New Mexico conditions are so diverse that, while one location in summer has broiling heat, another may at the same time have very cool weather, or, that in winter one section may enjoy delightfully warm days, while another is wrapped in snow and ice with a temperature below zero. It is thus apparent that great care must be used in placing a patient at any season of the year, especially where tent life is recommended.

The altitude of towns in the southern portion vary from about sea-level at Yama to 1,100 feet at Phœnix, 2,000 feet at Castle Hot Springs, 2,500 feet at Tucson and 2,500 feet at Roswell, New Mexico. These are all practically desert towns, and the humidity in each case is very low under ordinary weather conditions. The total yearly rainfall is comparatively slight and owing to the limited amount of vegetation any ordinary moisture is quickly absorbed or evaporated. There are few nights in winter when tent-life is uncomfortable for patients who are naturally robust and used to some exposure. The diurnal range, however, is very considerable, the thermometer showing a variation of 30 to 40 degrees Fahrenheit in twenty-four hours. Sudden changes are also met with. Patients who are not naturally strong or who are in a somewhat advanced stage of the disease run great risk in living in tents during this season. Most resorts, sanatoria and boarding houses in this region are provided with rooms which have screened porches. On these porches patients may rest and sleep during inclement weather, spending the nights within the rooms or on the porches, as the weather conditions dictate.

A large majority of days during the autumn, winter and spring months are warm, delightfully clear and free from wind or humidity. Patients living in tents during proper weather usually make far more rapid gains than those living in hotels or apartments. This section is very agreeable for seven or eight months of the year, but the heat of the summer months is too severe and debilitating for invalids.

Tent-life has multiplied with great rapidity during the last three years. Individual tents and tent resorts or settlements are mostly placed outside the town limits, usually several miles out on the desert, where they are free from moisture caused by street sprinkling, irrigation and contaminating dust from the streets. The town physician should give detailed instructions in matters of personal conduct, hygiene and diet as no rigid rules are enforced at the resorts. Nutritious and well-cooked meats are seldom found in the Southwest, but other foodstuffs of good quality, especially fresh milk and eggs, are usually very abundant.

Towns in the northern sections of Arizona and New Mexico, as well as in Colorado, are located in a much higher altitude, and are therefore cooler during the summer months and, of course, much colder in winter than those of the south. Prescott, Albuquerque, Santa Fe, Las Vegas, Silver City, Fort Bayard (further to the south), as well as Colorado Springs and Denver, range in altitude from 4,800 to 7,000 feet. These towns have strong winds almost daily and often rain, snow and very cold weather during all but the warm months, rendering the winter season unpleasant to the invalid and often dangerous to tent dwellers. Living in tents during severely cold weather should be forbidden.

These places, however, are delightful during the warm summer months. A period of about four months in the northern section and about eight months (October to June) in the uthern is as nearly ideal as possible.

soThe cost of living is quite high in the far Southwest, as the region produces but a small portion of what it consumes, and owing furthermore to high freight rates and the rapacity of nearly every one with whom the stranger comes in contact, the necessary expense of decent living is 50 per cent or more higher than the average man is accustomed to. Board may be obtained in sanatoria, tent settlements, etc., at from $10.00 to $25.00 per week. The best hotels (which should all be classed as second or third rate) charge from $3.00 to $6.00 per day. Wearing apparel, house furnishings, etc., are much higher than in the East.

A word of warning must be given against sending patients to this country who are not provided with sufficient means to carry them over a protracted period. Employment cannot be obtained except for a few skilled mechanics who are strong enough to work. The patient must be given to understand in the first place that no case can be guaranteed within a specified time. He may and often does improve wonderfully in a few months or even weeks, but the road to complete recovery may in any case be long and tedious.

J. K. C.

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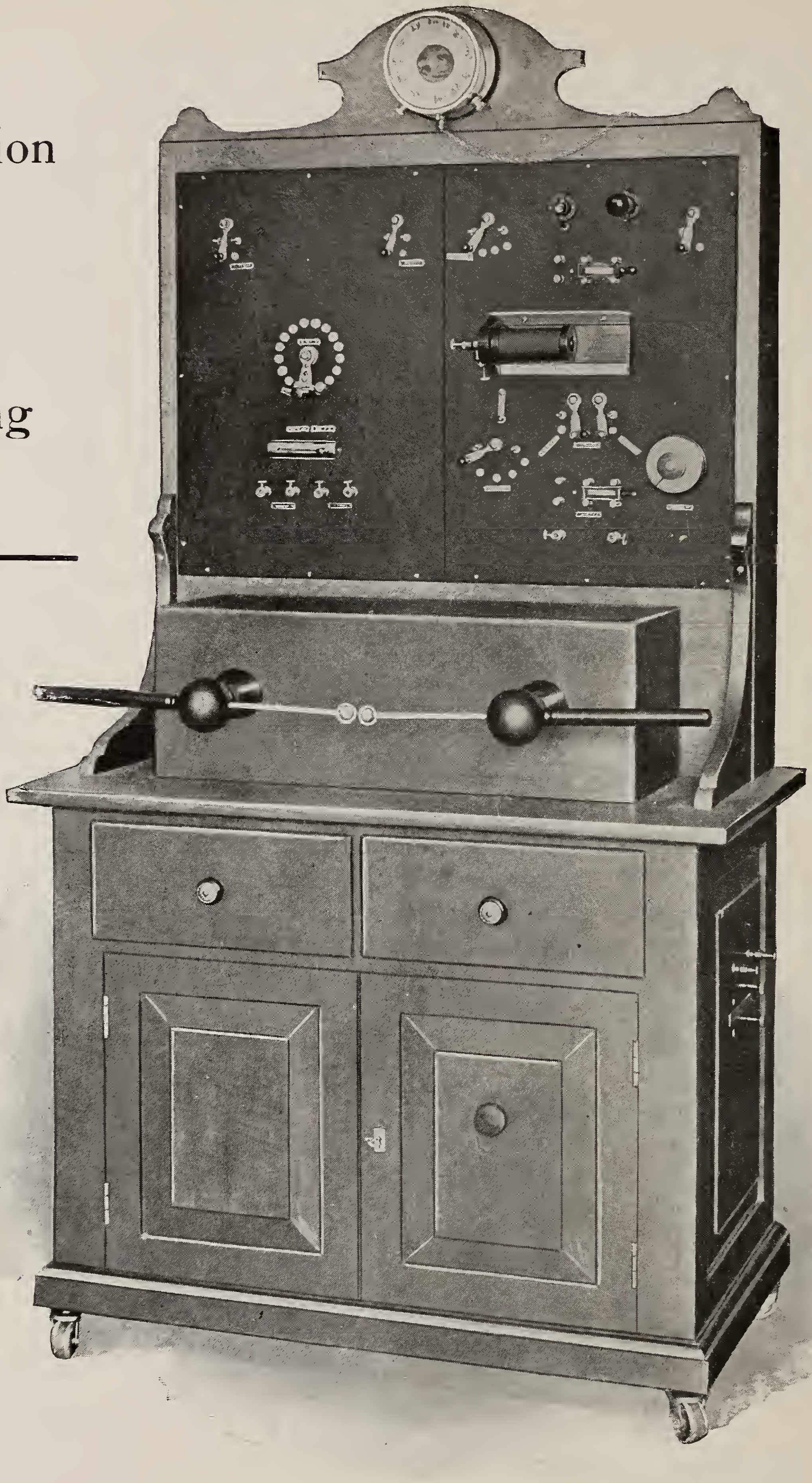

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